THE

Practical Teacher

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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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Health at School.

No. I.—INTRODUCTORY.

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THE Hygiene of School Life, or as it is called in common parlance, 'Health at School,' is of paramount importance in connection with the subject of Political Economy and the prosperity of the nation. It must be taken into consideration by all those who are in any way connected with the education of the young, and especially by the teacher himself. It is fully equal to that of the hygiene of the nursery. Its responsibilities are even greater: both have been very much neglected in the past by all classes of the community.

It is in the dawn of life that decided impressions are immediately made upon the ductile material of the human constitution which will make or mar the framework as well as the delicate machinery of the future man. Those impressions may lead him on to a life of happiness and health, or to one of unhappiness, which will be to some extent consequent upon the ill-health and low bodily vigour which insanitary surroundings may produce. If the impress is put on too heavily, the result may be disastrous. The form of the body itself; the shape of a limb; the development of an individual organ; the cultivation of a sense, may be each and all interfered with in the early days of childhood: the influence thus brought to bear may stamp its impress upon the child, and determine the result as to certain careers which it shall not follow. How many curved spines are due to wrong habits contracted in school! How many eyes have been deprived of their accommodating power by indulgence in positions which it is the teacher's duty to disallow! The error of the nurse or of the teacher may mar or even destroy the noblest work of God.

The damage which results from a misunderstanding or an ignorance of the first principles of the laws of health is manifested very clearly by statistical evidence so far as total loss is concerned, but it tells us very little of that partial mischief which so often follows from neglect of nature's laws. It is thoroughly well proved by repeated reports, that out of every 1000 children born into the world in populous districts, at least 150 depart this life before they have lived a twelvemonth. Yet is it not the birthright of every child that it should enjoy perfect health, and reach a good old age without being subjected to the influence of hereditary diseases? The passions and the ignorance of our forefathers still produce an influence, and at the present day lust and disease are daily robbing an immense multitude of that birthright which belongs to them. It is in diminishing the incidence of this mischief that 'Health at School' requires deep consideration. Nearly one-half of all the deaths which actually take place are those of children under five years of age. It would be waste of time to illustrate these statistical facts by reference to individual cases, but for the sake of example I may mention Birkenhead; the report for that township is now before me. For some years past, upwards of fifty per cent. of the deaths from all causes were those of children under five years of age. That is, one-half of the population never had the opportunity of going to an elementary school at all, for they 'were not' in existence at the age of five. The deaths of persons over sixty years of age were twelve per cent. only. Of late years, general hygienic measures have been adopted by the local authority in that locality. These measures have reduced the death-rate of young children to forty per cent. of the gross mortality, and have raised that of those above sixty years of age to twenty per cent. This result shows what may be done by corporate action when well directed; but no action taken by a local authority can reduce infant mortality to anything like a moderate standard unless there is at the same time an extension of hygienic knowledge among the masses; until parents and guardians know something of the first principles of sanitary laws, the reduction in infant mortality will not be great.

The bearing of these points upon 'Health at School' is shown in the fact, that it is sometimes asserted by intelligent people that this infant mortality is a good thing, that it weeds out from the masses the weak, the delicate, and the diseased, and leaves behind it the

stronger and better developed part of the population; that it eliminates the unhealthy, and is a benefit to the rest of mankind; and that it gives a teacher a better material to work upon: that there is a good side in the mortality among infants as well as a bad one.

This argument is an unsound one. If the effect of unhealthy states of the community were limited to those who die, there might be something said for it by the student in political economy, if we left out of the problem all reference to the morality of the result. It is certain that the unhealthy condition which leads to this great infant mortality tends at the same time to lay the foundation for mischief in a large portion of those who pass the age of five years. These fundamental stages will develop in an increasing ratio as time goes on, and the want of true sanitary knowledge in the nursery finds its practical demonstration in the production of manifest disease in the individual long after the nursery has been left and even the state of pupilage in elementary schools passed through. School life may bring this hidden diathesis into light sooner or later, according to the conditions under which that school life is carried on. It may bring out to the surface and expel it from the constitution on the one hand, or it may on the other hand fan it into activity and hasten its development into a very manifest disorder, or even into a fatal disease. This result will be brought about in one way or the other according to the correctness or otherwise of the principles upon which the surroundings of the school as to its sanitary condition have been laid down, and the customs which may be indulged in by the scholars or insisted upon by the teacher. There is something more in 'Health at School' than simply preventing the spread of epidemic or of enthetic disease. There is something more than meets the first thoughts which arise when we speak of the presence or absence of this or that form of epidemic, something which specially excites the dread of the teacher when the examinations of his scholars are about to commence. In addition to this there is a *minus* quantity in the matter which may or may not be great in the inhabitants of a particular district, but which will tell more or less upon the general health of every school, according to its surroundings and the customs which are followed within its walls. This *minus* quantity represents the depreciation in the general health which is certain to belong to some or all of the children, and will be the measure of their constitutional tendency to take on epidemic influences whenever they are presented to them either within or without the school buildings themselves. This minus quantity will be comparatively harmless in a properly arranged and well conducted school, but it becomes of serious importance in one in which insanitary surroundings and insanitary principles are allowed to be present; our duty therefore is not only to keep out all epidemic or infectious influences, but to raise the health tone of the whole body of scholars, so that this *minus* quantity may be gradually decreased and an approach made to a really healthy level. There therefore is an element to be considered which is altogether outside the question of infectious diseases, and yet is intimately mixed up with them. If this *minus* quantity in the matter of general health is considerable whenever the germs or exciting cause of infectious or epidemic disease find admission into a given school, they will manifest themselves with greater or less intensity according as this *minus* quantity is considerable or otherwise. If no such germs or exciting causes of specific diseases are imported into a school at any particular time or season, yet its arrangements may be such as may prepare for the reception and propagation of an infectious malady elsewhere than within the school. The managers may have made every practicable arrangement for the exclusion of specific forms of disease, but they may be at the same time assisting to increase the *minus* quantity in the matter of general health and damaging the community, whilst they may be pointing all the time to the efficiency of their arrangements in excluding such diseases as scarlatina or diphtheria from among their scholars.

This element is altogether outside the so-called germ theory or the glandular theory as applied to epidemic or infectious diseases, and hitherto has not been at all considered upon its merits. Thus, although no germ of a particular disease or particle of morbid matter may be distributed by a given school, it may yet be the means by which the general debility of the neighbourhood may be increased. It may add to the number of deaths in a given district from tubercular diseases, simply because the foci of that particular form of malady which are to be found more or less in the constitutions of the children of all classes have been allowed to increase in quantity, by the want of good hygienic surroundings in the school-house and class-rooms. If the construction of the buildings and the principles pursued in the school had been carried out on sound foundations, different results would have arisen. These foci of disease, which are something like particles of ice in a stream, the surface of which has been reduced to a temperature slightly below the freezing-point, increase or decrease according as the *minus* quantity in the matter of general health rises or falls. If this *minus* quantity disappear, the foci of disease dwindle away, and may be at length so dwarfed as to be incompatible with any future growth. It is probable that these foci of tubercular disease are to be more or less found in nine-tenths of the younger portion of our population; and the duty of the school authority is not only to prevent the spread of infectious diseases among their scholars, but also to prevent the increase of this morbid matter which already exists in the frame of those submitted to their care. Taking one illustration for our consideration, and looking at the foci as if they were of microscopic particles of ice in a stream, the temperature of which stream rises or falls according to its surroundings; so school life adds to or diminishes the size and number of these foci in a given constitution, until they are enabled either to assert their individuality by collective action, or are so dwarfed and diminished as to altogether lose the influence which they were about to obtain. It should be thoroughly understood that the whole population of the country is more or less infected with morbid products. These have resulted from a long-continued disobedience to the first laws of health, either in relation to hygiene or to the general nutrition of the body. These tendencies are transmitted from parent to child just as much as other conditions which belong to race. It is more than probable that if the parentage of each child could be traced back to four generations, some one or more of the thirty persons to whom a particular child has been indebted for its existence would

be found to have been the subject of some disease capable of transmitting a hereditary taint. These taints may be classed under several heads. There is the tubercular, the syphilitic, the gouty, the rheumatic, and the cancerous taint. It is in the power of school hygiene to interfere with the development of these taints, to dwarf them by the arrangements of the school, to prevent their increase by the teachings of the master, and to oust them from the dominion they now hold upon the constitution of man. I am not about to assert that all these hereditary taints are to be removed by attention to 'Health at School.' At least one-half of the deaths which occur now-a-days is caused by diseases which are connected in their origin with the tubercular diathesis, and it is more especially with this taint that school hygiene has to grapple. The sanitary or insanitary condition of the school and its surroundings have in days gone by, and are even still adding to this. The tendency to tubercular disease is often fanned into activity by ill-directed school life, and just as it can be increased by wrong steps, so it can be diminished by right ones.

There is therefore much more in the question of 'Health at School' than is implied in its ordinarily accepted meaning, something more than arises from a consideration of the means to be taken to exclude the foci of infective diseases or to limit epidemic influences. We have to diminish in our raw material the germs of mischief which are already there; and just as we try by education to prevent the growth of evil mental passions, so we ought to try and prevent the growth of those germs of evil which are likely to undermine the health of the future men.

Our duty, therefore, is to dwarf these germs, to diminish the chances of their development after the child has left the school-house, as well as to prevent the intrusion of infectious agencies which are capable of spreading from child to child.

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Anecdotal Natural History.

No. I.—THE SQUIRREL TRIBE.

BY REV. J. G. WOOD, M.A., F.L.S.,

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AND THEODORE WOOD,

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ALMOST everybody is familiar with the common squirrel (*Sciurus Europæus*), that reddish-brown animal with the bushy tail which is so plentiful in nearly all our woods and forests, where it sometimes works considerable mischief. And even those people who have never been fortunate enough to see it in its native haunts, springing from tree to tree, and gambolling merrily among the branches, must have noticed the unfortunate specimens exhibited for sale by the itinerant hawkers who pervade the streets of the metropolis and other large towns.

Besides the British species there are many other squirrels found in different parts of the world, Australia being the only continent where none are known to exist.

Particular attention is drawn to this point, because in nearly all travellers' accounts of Australia we read of the flying squirrel among the quadrupeds inhabiting that land. In fact, however, the so-called squirrels are not squirrels, nor even rodents, but are Marsupials, belonging to the great group of Phalangists.

The mistake arises from the natural errors made by travellers and colonists, who name every creature they see after the inhabitants of their own country.

South Australian colonists talk and write with marvellous composure of wolves, bears, monkeys, bats, cats, squirrels, rats, and mice as inhabiting the country. Similarly American writers sadly bewilder the tyro in zoology by mentioning American buffaloes, lions, tigers, and panthers, all these creatures being strictly confined to the old world. The 'Robin' again, so often mentioned in American literature, is not our English redbreast, as is usually assumed, but an erroneous name for the migratory thrush, a bird far larger than the redbreast and belonging to a totally different group.

The squirrels belong to the great division of the rodents, which comprise nearly a third of all the known mammalia. The animals of this group are distinguished by the possession of two powerful chisel-edged incisor teeth in each jaw, formed for cutting or gnawing away hard substances, and which are replaced by fresh material as fast as they are worn away. The power of these incisor teeth is strikingly exemplified in the beaver, which has been known to gnaw its way through logs no less than eighteen inches in diameter.

Were there not some means of replacing these teeth as quickly as they are worn down, the death of the animals would speedily follow, as they would shortly starve from their inability to procure food. In order to avoid this, the teeth are continually forced forward from the jaw by the formation of fresh substance at the base, which is secreted by a pulpy substance at the root of the tooth. Now, as this growth takes place whether the teeth are used or not, it follows that, unless they were in constant use, they would soon increase to an inordinate length, and before very long would project from the mouth. Such an event does occasionally occur, when by some accident one of the incisor teeth has been broken short off. The corresponding tooth in the other jaw, finding no resistance to its growth, continues to increase until it sometimes forms a perfect circle outside the mouth, usually resulting in the death of its owner by preventing it from feeding.

Without some means, however, of preserving the chisel-like sharpness of these teeth, the mere replacement of wasted substance would be of little use. In order to obtain the desired result, the teeth are constructed after a very singular fashion.

The body of the tooth is composed of pure ivory, coated on the outer surface with a thin layer of enamel, which being of a very much harder nature, is not worn away with the same rapidity. Besides this, the ivory nearest the enamel is harder than the rest, and the softer parts being easiest worn down, the edge of the tooth always keeps the same proportions, the actual cutting being performed with the edge of the enamel.

Our carpenter's chisels are constructed on exactly the same principle, the chief portion of them being composed of soft iron, while a very thin plate of steel is laid along the back and forms the cutting edge of the tool.

So much for the characteristics of the rodents as a

whole. Now for those of that branch which are known as squirrels.

The true squirrels are scientifically known as *Sciuridæ*, or shadow-tails, a title derived from two Greek words, the former signifying a shade and the latter a tail. This refers to the habit in these animals of carrying the tail over the back, as though to protect the body from the rays of the sun, a position always adopted except when running or leaping. They are remarkable among the rodents as possessing particularly perfect clavicles or collar-bones, which enable them to use the fore-paws to a certain extent after the manner of hands. This is especially the case in carrying food to the mouth, when the paws are managed with extraordinary dexterity. In eating a nut, for example, a squirrel, by the aid of its fore-paws and teeth alone, will break the shell and peel the kernel to the full as successfully as a skilful human being furnished with crackers and penknife. And it does so as follows. Holding the nut close to the teeth, it gnaws away at the point of the fruit until it fairly pierces the outer shell. It then dexterously inserts the edge of

Squirrel's Summer Nest.

the upper teeth into the aperture, and splits away the shell just as an idle boy does with his knife when opening nuts in school hours. By means of its hand-like paws, it then holds the kernel against its upper teeth, and rapidly turning it round and round, strips off the whole of the peel before beginning to devour it.

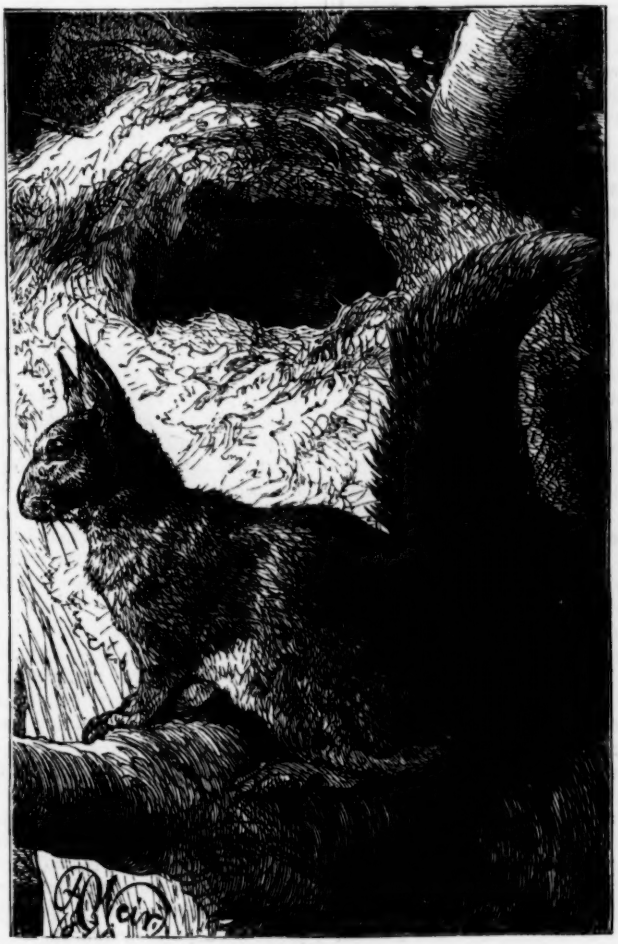
With the exception of the jaws and the adjacent parts of the head, the skeleton is exceedingly slight and fragile in order to suit it to the rapid movements of the animal.

To furnish the squirrels with the means of ascending the trees in which they spend the greater portion of their existence, the long toes are provided with sharp, curved claws, which can be inserted into the smallest crevices of the bark, and thus secure a firm foothold.

The rapidity and ease of their aerial motions is something astounding. A squirrel will gallop up a perpendicular tree trunk fully as fast as a cat can run on level ground, and will throw itself from branch to branch with the most perfect recklessness. And even if it misses its mark, it simply extends its limbs and

allows itself to fall to the ground from most wonderful heights, never seeming to be in the least damaged by its rapid descent. One would imagine that the creature must infallibly be dashed to pieces, but, almost before one can look round, the squirrel is off to the nearest tree trunk, where it is quickly lost to sight amongst the foliage.

As a refuge both by day and night, and also as a place wherein to rear their young, the squirrels always construct a large and comfortable nest, generally in the fork of some lofty branch, and always carefully concealed from sight. The materials are chiefly leaves, grass, and moss, woven together in a most beautiful manner, and forming a perfect protection against the rain. The old nests may sometimes be seen in winter when they are no longer surrounded by foliage, and stand out boldly among the naked boughs.



Squirrel's Winter Nest.

In these nests the young, three or four at a litter, are brought up, and remain until they are old enough to shift for themselves.

At the approach of winter the squirrels, not being able to find their food during the cold months, lay up stores for use during that period. Their provisions consist generally of nuts of various sorts, grain, beech-mast, and so on, and are hidden away as a rule in holes at the roots of trees in the neighbourhood of their winter habitation. It is a somewhat curious fact that the squirrel never includes a bad nut in these hoards.

This winter retreat is also a nest of much the same character as the former, but hidden away in holes in trees, the junctions of large branches with the trunk, and similar localities. As soon as the cold weather fairly arrives, the squirrels, having previously laid up their winter stores, repair to this hiding-place, and there pass the time until spring, when they again return to their summer haunts. For the greater portion of the intervening period they lie in a state of complete unconsciousness, something more than sleep and less than death, and which can be only partially described by the word 'trance.' This state is not, as is generally imagined, produced by intense cold; for should the temperature fall below 32° Fahrenheit, or 'freezing-point,' a hibernating animal is first awakened and then killed by the frost. Those animals, therefore, which pass the winter in a state of unconsciousness, always select a retreat where they are sheltered from the direct action of the elements, and where the temperature is only slightly varied.

While in the hibernating condition respiration entirely ceases, and the animal could be kept for hours under water, or in a vessel of carbonic acid gas, without the slightest effect. The circulation of the blood is greatly retarded, and digestion, at any rate in those animals which spend the whole winter in unconsciousness, is wholly at a standstill.

The squirrel, however, is only a partial hibernator, and is obliged to leave its hiding-place three or four times during the winter months in search of food. For this purpose it always selects a milder day than usual, and on such occasions may be seen repairing to its stores for a meal before again proceeding to its place of refuge. These hoards seem always to be more than sufficient for its wants, and the remainder of the provender is left to its fate. Sometimes the nuts, etc., take root, and the squirrel is often the cause of trees springing up in unexpected places.

In the far north the cold of the winter has a very marked effect upon the fur of these animals, which from a rich brownish red becomes of a pale grey hue. And even in our own climate there is a perceptible change in the colour of the fur at different periods of the year.

It is not generally known that squirrels can use their paws as paddles, and by their aid swim to considerable distances.

In some parts of the eastern coasts of Scotland, where innumerable armlets of the sea run many miles inland, the squirrels are in the habit of swimming across from shore to shore, and making rapid progress through the water. A friend was an eye-witness of this habit. Being in a boat, he came upon the little creature as it was swimming, and took it into the boat.

As it was tired with its journey, it allowed itself to be caught without any difficulty. But as soon as it felt itself rested, it sprang back into the water and swam steadily to land.

Leaving this country for America, we find there are many kinds of squirrels found in that country, several of which are very interesting. For example, there is the Grey Squirrel (*Sciurus cinereus*) of North America, which is extremely abundant, and often works very great damage to the growing crops. In Pennsylvania, more than a century ago, these animals were found to be so very destructive that a Government reward of threepence per head was offered for all that were killed. In a single year, a sum of no less than £8000 was expended in redeeming this promise, which gives a grand total of 640,000 squirrels destroyed.

Now, although these animals wrought such terrible mischief to the agriculturist, and by their numbers and perseverance ruined the result of his labours, in their native forests they were in their proper situation, doing the work for which they were sent into the world. But as soon as man arrived upon the scene, cleared away the jungle, and laid out the ground for cultivation, he upset the balance of nature: the squirrels were no longer required, and became a plague instead of a benefit, making it necessary to thin their number. Even our own squirrel is occasionally the cause of much damage, especially in young plantations, where it has a habit of nibbling off the topmost shoots, and so stopping the growth of the tree. Nor does it confine its depredations to vegetable life, for it is by no means uncommon to find a bird's nest ransacked by the animal, and the eggs or young ones devoured, as the case may be. It is probable that the squirrel is the real delinquent in many a case of nest-robbing when the blame falls on the shoulders of thoughtless schoolboys.

It occasionally happens with the grey squirrels, that, having pretty thoroughly devastated a neighbourhood, and finding winter approaching, they are unable to lay up a sufficient stock of food on which to subsist until the spring. Knowing instinctively that if they remain in their present locality they must inevitably die of starvation, they migrate in vast numbers, after the fashion of the lemming in Northern Europe, allowing nothing to check their course, climbing over instead of avoiding any obstacle, such as a wall or house, and leaving nothing eatable behind them. Every blade of grass and every green thing disappears, and the transit of one of these hosts leaves the country in much the same condition as if a swarm of locusts had passed over it.

Then there is the Black Squirrel (*Sciurus niger*), which, though not nearly so numerous as the preceding species, is still far from uncommon. It is a curious circumstance that the black and the grey squirrels seem unable to live in company, and as soon as the latter animal shows itself, the former disappears. As its name implies, this animal is of a uniform black hue, and from the fineness of the fur, is much sought after for the sake of the skin.

There is a somewhat strange-looking squirrel inhabiting Borneo, and which is popularly known as the Long-eared Squirrel (*Sciurus macrotis*). It is thus named on account of the singularly long fringe of hair with which the ears are decorated, which is of a dark brown colour, and pretty well two inches in length. The tail also is remarkably bushy.

Besides all these, there are some animals, none of them inhabiting this country, however, which are generally known as 'flying' squirrels on account of a singular modification of structure. This is found in the skin of the flanks, which is developed to a large extent, almost hiding the paws in its folds when the creature is at rest. When in motion, however, and particularly during the tremendous leaps which these animals make from branch to branch, the legs are stretched out as far as possible, the loose skin acts as a parachute, and the squirrel is enabled to pass through a much greater distance than would otherwise have been possible.

The petaurists of Australia possess a similar development of the skin, and use it for a similar purpose.

One of the best known of the flying squirrels is the Taguan (*Pteromys petaurista*) of India, which is of a brownish colour, varying from deep chestnut along the back to a greyish white on the under surface of the body. The tail is long and bushy, and very much darker in colour. The whole length of the animal is nearly three feet.

Leaving the true squirrels, we come to a very closely allied branch, the members of which, however, construct their habitations beneath the earth instead of among the branches of trees, and but rarely leave the ground. These are called ground squirrels, and are furnished with cheek-pouches, which the true squirrels do not possess. The object of these we shall presently see.

The Hackee, Chipping Squirrel, or Chipmuck, as it is indifferently termed (*Tamias Lysteri*), of North America is one of the most widely known of these quadrupeds. It is a very pretty little creature, rather less than a foot in total length, of a brownish-grey hue, with five black and two yellow stripes running longitudinally along the back. The under surface is of a fine white.

The hackee is very abundant over a great portion of North America, and may be seen almost everywhere dashing in and out of the underwood with a rapidity which has caused its movements to be compared to those of the wren.

By way of habitation, and also as a refuge from its numerous foes, it constructs rather complicated burrows below the surface of the earth. For this purpose it generally selects some protected situation, such as the roots of a large tree, the side of a bank, or the foot of a hedge. A winding tunnel, usually of considerable length, leads to the dwelling chamber, or nest, where the young are brought up, and from this run galleries leading to other chambers which are used for storehouses. In these a most astonishing quantity of food is laid up. In a single nest, we are told, were found no less than a peck of acorns, two quarts of buckwheat, a quart of beaked nuts, some grass seeds, and a quantity of maize, with which the interstices were filled up.

It seems almost incredible that so small an animal as the hackee can lay up so large a quantity of food, but such is the case, and it is in carrying the provisions to the burrow that the use of the cheek pouches is found. It can, of course, carry only a small quantity at a time. Four beaked nuts, for example, constitute the load for a single journey, three being packed into the pouches, and the fourth carried between the teeth. In order to prevent the nut from hurting its mouth, the hackee invariably bites off the sharp beak of the fruit before consigning it to the pouches.

When thus loaded, the animal presents a very curious appearance, bearing a ludicrous resemblance

to a human being suffering from a very bad attack of mumps.

The well-supplied condition of the hackee's larder is widely known, and in times of scarcity the natives repair to the burrows, and, digging out the contents, find the materials for a hearty meal.

When pursued by one of its numerous enemies, the chipping squirrel always takes refuge in its burrow, trusting in the inability of its pursuer to follow it down the complicated windings of its narrow tunnel. There is one foe, however, to whom this is no obstacle, and which follows the hackee to the very end of the burrow, there making a meal of the unfortunate owner. This enemy is found in the stoat, which sometimes kills the whole of the occupants of a burrow merely for the gratification of sucking their blood.

All three of the popular names are applied to this animal on account of the curious cry, which somewhat resembles the clucking of newly-hatched chickens. The scientific title, *Tamias*, is a Greek word, signifying a storekeeper, the application of which is at once apparent.

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Short Historical Anecdotes.

BY REV. SIR GEORGE W. COX, BART., M.A.

(1) The Emperor Akbar and his Subjects.

THE most splendid court in the sixteenth century was that of Akbar, the greatest of the Mogul emperors of Hindustan. He was born at a time when the fortunes of his father Humayun were at their lowest ebb. When he was four years of age his mother took him to Cabul, which Humayun had succeeded in reconquering. The Emperor took the child into his arms, and said, 'Joseph was cast by his brothers into a well; but he was raised, as thou shalt be, to great glory.' His hope was abundantly realized. The life of his son was marked throughout by the strongest sense of duty; and duty with Akbar embraced the whole field of human conduct. Undauntedly brave in battle, he was full of mercy for the conquered. After one of the many battles fought on the field of Panipat, the Hindu general of the defeated army was brought before him by his tutor Behram Khan, who commanded him to strike off the head of the infidel. The boy, then fourteen years of age, burst into tears, and lightly touched the prisoner with his sword; but Behram, in no way satisfied with this mere sign of conquest, cut him down. Behram would have made the young emperor a conscientious Mahometan—that is, one who can tolerate no faith but his own. But Akbar had scarcely reached manhood before he became convinced that though persecution may make men hide their opinions, it produces no change in them, and therefore fails in its own ends. His enemies accused him of being a persecutor himself; but the only instances of persecution recorded of him are the following. When one of his courtiers asked him what he supposed that orthodox Mussalman princes in other lands would say of him, Akbar ordered him to leave the room. When another told him that he was following the counsels of 'hellish' advisers, the Emperor said that such language assuredly deserved a blow; but the blow was not inflicted. Later in life he published his creed to his subjects. It was simply this—that God should be reverenced and loved by all; that all were bound to serve and worship Him by living righteously, and by doing the good which would promote the welfare of their fellow-creatures, and bring to themselves the peace of a quiet conscience. For an account of Akbar's system of government, see Cox's *History of the Establishment of British Rule in India.*

(2) The Emperor Shah Jehan and Sivaji.

The name of the Mahrattas was for ages a sound of terror throughout Hindustan; and the power of the Mahrattas first became formidable in the time of Shah Jehan, the grandson of the illustrious Akbar. The struggle between the Mogul emperors and the Mahratta chiefs was the struggle between the Mahometan and the Hindu religions; and it was with the special purpose of regaining for Hinduism its old predominance that Sivaji, the founder of the Mahratta empire, braced himself to his work. He had grown up among the wild hills and valleys of the Western Ghauts; and with books and learning he would have nothing to do. He would not be taught either to read or to write, but he put an undoubting faith in the revelations which his mother said that she had received from the goddess Bhowani, and which announced his future greatness as the restorer of Hinduism to its ancient supremacy. He first gained possession of a hill fort at Poona, and was lucky enough to find in it a hoard of gold, which enabled him to repair its works and build another fortress on a neighbouring hill. At last he ventured to lay hands on convoys bearing treasures for the emperor; and Shah Jehan retaliated by placing Sivaji's father in a dungeon, in which he was walled in up to the shoulders, and telling him that the remaining bricks would be put in their places unless he immediately brought about the submission of his son. Sivaji, unable to resist this argument, threw himself on the Emperor's favour, received his forgiveness, and having obtained his father's freedom, betook himself to his old ways, building for his stronghold the impregnable fortress of Pertabgurh, on the summit of a hill a few miles to the south of Poona.

(3) Clive and Omichand.

The exploit of Clive in seizing and holding the fortress of Arcot is amongst the most memorable of military enterprises in the history of India, and perhaps of any other country. He had with him only 500 men, and of these 200 only were Europeans. Of the eight officers who accompanied him, four only had had any military training, and two only had been in action; the rest were clerks who had just left their counting-houses. With this force he marched through a tremendous storm of lightning and rain, and by so doing struck terror into the garrison, which abandoned the fort and allowed him to enter it unopposed. For fifty days he held it against overwhelming odds; and his final victory ensured the establishment of British rule in India. It is strange that a man thus great in legitimate war should have stooped, in subsequent dealings with the nation of India, to make use of those weapons of intrigue and falsehood which are as congenial to the Eastern as they are abhorrent to the English mind. When the conspiracy was formed for putting to death the Nawab Suraj-u-Daula, whose name is infamous for his share in the tragedy of the

Black Hole of Calcutta, Clive did not hesitate to join it. His agent was a merchant named Omichand; but Clive was, or seemed to be, astonished when Omichand demanded a sum of not much less than half a million sterling as the price of his secrecy, and insisted that this compact should be sanctioned by the treaty between the English and the man who was to be put into Suraj-u-Daula's place. Clive agreed to the terms, but he had two treaties drawn up—one on white paper, one on red, the compact being named only in the false one, for which he forged the signature of Admiral Watson. When Clive's great victory at Plassy made it necessary to carry out the treaty, he received Omichand with his usual graciousness; but when the treaty on white paper had been read, Mr. Scrafton, on a signal from Clive, turned to Omichand and informed him that the treaty on red paper was a trick, and that he was to have nothing. Omichand, it is said, fell back insensible, and when brought back to consciousness was little better than an idiot. This has been denied; but it has no bearing on Clive's share in the business. Happily, Clive's example has not been followed by Englishmen in India, and Lord Macaulay has well said that the one great lesson enforced by the whole history of British India is that it is not prudent to oppose perfidy by perfidy, and that the most efficient weapon with which men can encounter falsehood is truth.

(4) The Black Hole of Calcutta.

The tragedy of the Black Hole of Calcutta is a terrible commentary on the evils inherent in eastern despotism. In one sense it was an accident, but it was an accident which could never have happened in a country where the rulers are compelled to remember that they owe a duty to their subjects. Suraj-u-Daula never meant that his prisoners should be stifled to death; but they were stifled to death because, before he went to sleep, he had given no orders about them, and his officers dared not at the peril of their lives disturb him while he slept. In fact, this wretched youth (he was barely seventeen years old) had been brought up in the belief that his own pleasure was the one end to be aimed at by every one in everything, and he had learnt the lesson greedily. He saw that the English settlement in Calcutta was rising in importance; he believed the English to be the possessors of almost unimaginable wealth, and he resolved to seize their treasures and expel them from the country. It seemed at first as though he would succeed in his enterprise. The governor fled with the women and children to the ships, which dropped down the river, leaving those who remained behind to their fate. These were overpowered by the enemy, who rushed in when the gates were opened to admit a flag of truce sent by Suraj-u-Daula; and the prisoners were brought before the tyrant, who assured them that their lives were safe, and that no harm should befall them. But his mind was running on his personal disappointment. He had expected to find millions in the Calcutta treasury; he could lay hands only on £50,000. So he went off to sleep without saying a word about his captives. Their guards, who dared not disturb the Nawab, insisted that the prisoners, 146 in number, should all go into a room about 20 feet square, lit by a single small window. It was a dungeon in which two or three refractory soldiers may have been confined at a time; and into this Black Hole the miserable prisoners were driven at the point of the bayonet, and the door was locked upon them. The fierce heat of an Indian mid-summer's night intensified the agonising death struggle, while their entreaties to the guards to fire upon them and end their misery were received with shouts of mocking laughter. In the morning sixteen only remained alive. For all these things Suraj-u-Daula cared nothing. He had no thought except for the treasures for which he was still vainly searching; but even the native historians have not a word to say about this horrible catastrophe. The truth is, that the people of India are among the kindest in the world, but they heed nothing beyond the narrow circle of their family and their caste; and thus, such an incident as that which has made the memory of Suraj-u-Daula infamous among Europeans, passes with them as a matter of course, not worth the mentioning.

(5) The Defence of Korygaum.

The struggle between the Mahrattas and the English was marked by two instances of singular heroism on the part of British officers. The Peshwa, or minister who had long since usurped the powers belonging to the successors of Sivaji, was evidently striving to gain his ends by systematic treachery, when Mr. Jenkins, the resident at Nagpore, placed on the neighbouring Sitabuldi hill a force of 1400 Sepoys, with three troops of Bengal cavalry, and four six-pounders. With these troops a battle, begun in the evening, was carried on through the night against a Mahratta army of nearly 20,000 men, with six-and-thirty guns, and was decided the next day by the bravery and skill of Captain Fitzgerald, the commander of the Bengal horse. The Peshwa now sent for the representative of Sivaji from Satara, and pretended to rule in his name; but his plans were foiled by the splendid defence of Korygaum, by Captain Staunton, who, on Jan. 1, 1818, with 34 Europeans and about 750 native soldiers, defended the village until nightfall against the Peshwa's army of 25,000 horsemen and 6000 infantry. The Mahrattas refused to renew the fight the next day, and the Peshwa was driven to seek safety in flight.

(6) India under the Great Mogul.

In the year 1735, two Englishmen, dropping down the river with a convoy of treasure from Patna to Calcutta, saw a boat going by with baskets, which they supposed might contain fish; but in them they found thirty human heads. On that day, according to a long-standing agreement, the Raja of Monghyr had set out with thirty men to pay his tribute to the Nawab Alavardi Khan. The latter was likewise pledged to send only the same number to receive it, but with these he sent another force which was to lie in ambush. When the Raja came with his men, all were murdered except one, who carried the tidings of the massacre to the Raja's wife. She set the palace on fire and died with her son in the flames. That night the two Englishmen saw the smoke and blaze of a mighty conflagration as they lay at anchor in their boat on the river. The troops of Alavardi Khan were sacking and burning the city. Such was a specimen of government in Behar by a deputy of

the Viceroy of the Great Mogul, before the English brought order and peace to the country.

(7) Willoughby and the Magazine at Delhi.

The great Sepoy Mutiny shook the British rule in India to its foundations. It also brought out wonderful instances of bravery and heroism on the part of British officers and soldiers; and among these the devotion of Lieutenant Willoughby and his comrades stands conspicuous. Willoughby was in charge of the great magazine at Delhi, when the mutinous regiments who had hurried away from Meerut crossed the bridge over the river and made their way into the city. The magazine contained an immense store of powder and ammunition; and its contents would be invaluable for extending and maintaining the rebellion. The mutineers were well aware of this, and, aided by the mob of Delhi, which was always furiously excitable and turbulent, they brought their whole strength to bear upon the position. They were further aided by the Sepoys of the regiment which had been stationed in the city to guard the magazine. The people surged in crowds before its walls, and messengers, speaking in the name of Bahadur Shah, the pensioned representative of the old Mogul emperors, demanded its surrender, and were met by an absolute refusal. The defenders stood out as long as they could, but the ammunition at hand was soon exhausted, and it was impossible to leave the guns to bring more powder. Willoughby saw that there was no alternative for men who were determined to do their duty. On his giving the signal, a train previously laid was fired, and some fifteen hundred rebels were blown into the air with the contents of the magazine. Willoughby with two or three companions escaped to Meerut, maimed and mutilated; but his injuries were mortal, and he died a few weeks later after terrible suffering, leaving a name which Englishmen will not allow to be forgotten.

(8) Xerxes and Demaratos.

In his invasion of Greece, Xerxes had with him Demaratos, a deposed Spartan king. After the first general review of his unwieldy army, Xerxes asked the Spartan whether his countrymen would dare to oppose so overwhelming a force. On receiving his assurance that no harm should befall him for telling the truth, Demaratos told him frankly that if a thousand Spartans set out, they would most assuredly fight him. Xerxes laughed. 'What! a thousand men fight my great army! Come now, you were once their king; will you fight ten men? Yet if each of these will match ten of mine, you ought to match twenty. But if in size they are like the other Greeks whom I have seen, you must be only boasting. Let us reason it out. How could a thousand, or a myriad, or five myriads, who are all free, and not ruled by one man, withstand a host like mine? Why, we are more than a thousand to one, even if they were five thousand. If, like my people, they obeyed the will of one man, and were driven on by the scourge, they might stand out against numbers larger than their own. But of course, being free, they will not do so. Besides, if their numbers were equal to mine, I doubt if they could withstand us. Why, I have among my spear-bearers many men who will fight three Greeks at once.' Demaratos, by way of answer, confessed that he did not suppose that Xerxes would like to hear the truth, adding that he had spoken only from a sense of duty, since, as the king well knew, he bore no love to the Spartans. 'They have robbed me of my power, and driven me to a strange land where I was kindly received by thy father. Is it likely that I should set lightly by the kindness which he showed me? As for myself, I do not say that I am able to fight with ten men or with two. Of my own choice I would not fight with one; but if fight I must, I would take my chance with one of those whom thou thinkest equal to three Greeks. So, too, the Spartans one by one are like other men; but taken together, they become terrible to their enemies, for, though they are free, they are not without a law. Law is their master, whom they fear much more than thy people fear thee. Whatever law commands, that they do; and it commands always the same thing, charging them never to fly from any enemy, how strong soever he be, but to remain in their ranks, and to conquer or die.'

(9) Gelon and the Greek Envoys.

When the invasion of Greece by Xerxes began to look like a certainty, the Athenians and Spartans tried to secure the aid of the Greek cities in Sicily. But when their envoys, appearing before Gelon, the tyrant of Syracuse, warned him that the ruin of the Eastern Greeks would assuredly be followed by his own, Gelon reproached them bitterly for having left him to his own resources when he asked for their help against the Carthaginians. 'But I will not,' he said, 'deal with you as you have dealt with me. I will give you 200 ships and 20,000 men, with corn for all the army of the Greeks as long as the war shall last; but I can do this only if you will make me leader and chief of all the armies of the Greeks.' 'It is impossible,' the Spartan king replied; 'the children of Agamemnon cannot yield their place and their honour to a Syracusan. If you choose to help the Greeks, you must do so under the Spartans; if you will not, then stay at home.' Gelon kept his temper. 'My Spartan friend,' he said, 'abuse commonly makes a man angry; but I do not mean to pay back insults in kind. Let us make a compromise. If you rule on land, I will rule at sea; if you rule by sea, I will rule on land.' But here the Athenian envoy broke in: 'King of the Syracusans, the Hellenes have sent us not because they want a leader, but because they want an army. Of an army you say little; about the command much. When you asked to lead us all, we left it to the Spartans to speak; but as to the command at sea, we cannot yield it. It is our birthright.' 'You seem likely to have many leaders,' retorted Gelon, 'but few to be led. But since you will yield nothing, and grasp everything, go home and tell the Greeks that the spring-time has been taken out of their year.'

(10) Dienekes at Thermopylæ.

Before the fight in the pass of Thermopylæ, in which Leonidas and his three hundred fell, a man of Trachis, it is said, told Dienekes the Spartan that when the Persians shot their arrows, the sun was darkened by them. Dienekes answered cheerily, 'Our friend from Trachis brings us good news: we shall be able to fight in the shade.'

How to write an Examination Paper.

BY W. P. WORKMAN,

First in Honours, June Matriculation, 1880, and Senior Cambridge, 1878; also, First in Pure and Applied Mathematics in Senior Oxford and Senior Cambridge, 1878.

TO the young student, for whom these remarks are chiefly intended, examinations appear in a very different light from that in which the 'old hands' view them. To the latter they no longer seem decked with pretty colours, even from a distance, for nine or ten trials dispel all that sort of illusion, especially if in two or three of these, anxious eyes fail to find on the list the name they seek. But to the first examination, candidates generally look forward as to a week of varied pleasure, all the more enjoyable because of its freshness.

And these haloes of anticipation are in truth the very greatest of the dangers to which the neophyte is exposed. For an examination is not a week of somewhat amusing novelty, but one of unmistakeably disagreeable scribbling—six hours a day, and not an instant's rest for any who wish for success. If this fact is left out of consideration, the first day or two will be almost entirely wasted. The work is real, and must be done right well, or it were better left undone.

Of course, if the candidate always acts in accordance with the superlatively impossible maxim of never wasting any time, then there will be no danger from this source. But it is a matter of experience that boys, at any rate, certainly *will* waste time, and will absolutely refuse to be always working, and that even those who consider themselves quite free from this fault may often be led into it at seasons such as these.

Let it then be a settled rule for the candidate to try his utmost not to lose a moment until the paper is finished—not even by reflecting how pleasant and creditable it is to be an examinee, or, and the thought is common enough, how nicely or how badly that last question was done. For two minutes lost means a place on the list. In the Matriculation, for instance, though the maximum number of marks is 2800, probably 5 or 6 represents the extreme difference between two consecutive men on the classified list.

Preparations should all have been made before the time actually comes to test their value. At any rate, it is utterly ruinous to think of making them all at the last. The week of an examination may be employed for rounding off the angularities of your knowledge, and adding a little here and there, but to spend much time then in this will be fatal to all chances of success. During this period, which, depend upon it, will be a harder tax than you expect, do not rise very early and sit up very late in order to work up the subject of the next paper. The chief aid to health of mind is health of body. Take a run on the hills when the crowded room can be safely left. Let the fresh breezes clear your racking brain of all the accumulated cobwebs of toil. Follow not our super-studious friends, who go from six hours' hard work in a hot room to six hours' harder work in a hotter study, of which the results are quite too plain next morning in their flushed faces and fevered cheeks. Your learning is not worth much if it is imperfect without those pitiable last looks at the book, or last hints from the coach, of which you will see more examples in one week than you would care to do in a year.

But having taken these precautions to keep physically cool, take care also, as far as possible, to preserve mental coolness. Do not walk into the room all in a hurry, anxious to write down this and that 'crammed-up' fact ere it escapes your memory. Do not imagine the questions are too hard, and lose your temper, or that they are too easy, and you won't gain as much as you expected on your rival. Leave all those salutary reflections till afterwards. Also do not be always thinking you are 'floored' already, and it is no use to try any more. This is one of the most senseless and at the same time most frequent faults into which candidates may fall. For are they always the best judges of their own performances? And do they always know the minimum standard for success? In three-quarters of the cases that will present themselves, even the examiners do not know beforehand. If this be true, is it not foolish to lament over a failure when there is no certain proof of its existence? At any rate, if we go so far as to suppose that you only got a quarter of that arithmetic paper right, is there not a great chance that the mathematical examiners will let you through on such a small proportion as this if you happen to shine with particular brilliance in Euclid? It will not do any harm to trust to probabilities of success—far less harm, at all events, than to be discouraged by possibilities of failure.

But let it be supposed that the candidate is not deluded by vain anticipations of pleasure, and that he is absolutely determined to waste not an instant of the time which he knows to be so precious; let it be granted also that he is so cool and collected that nothing short of the fall of the roof on his head can disturb him; there still remains the important question of how he may show off his knowledge to the best advantage.

A method of reasoning as fallacious as common is this:—'Question x is a very hard one: they will give 50 marks for it; Question y is much easier: it will carry 25. I can get half of x right, three-quarters of y; then x is more profitable.' Nonsense! y is. For you would spend twice as much time on x as on y, and you would be just one-quarter more *thorough* on y. Now of all qualities, thoroughness is the most valuable, and not less because it is so uncommon. A slipshod is known at once. His knowledge is shallow, sometimes transient. On this account, unfair though it may seem on the face of it, his answers are depreciated, for with all examiners such a one is a marked and therefore a doomed man. Be assured of this—the thorough are always at the top, the shallow at the bottom, of any list whatever. Besides this, it is the rule in most examinations that all questions should count equally. This certainly is the case in the Matriculation and Home and Indian Civil Service. Hence the candidate who has reasoned with such elegance and force as to the precise relative value of certain questions, even if his answer to the one or the other be perfect, has been building his deductions on false premises.

Here, too, is the place to notice another piece of logic as fallacious and ultimately as ruinous as the first. 'I shall begin with the hard questions,' says

our supposed candidate, 'get them off my mind, and then start off with unencumbered energies to answer the easier.' And he begins with the hardest question, and finds it all too hard for him, and very quickly manages to get into a temper, and then, good-bye to a successful morning's work! He will be saved all such annoyances if he use the common-sense rule of 'easiest first.' If he climb his mountain of work by very gradual stages, he will scarcely notice the slope, and thus gain courage to face the difficulties which may await the end of his journey.

I will now suppose that my young Telemachus is fairly launched in his examination with, let us say, a mathematical paper before him. Since this is the subject which most of all requires the mind to be in good working order, it is the one in which self-recollection is most valuable. There are many problems presented which, through being in a hurry and not really thinking, the student passes by as above him, while if he had only resolutely attacked them they would have yielded at once to his assault. Usually the paper consists of a mixture in equal proportions of ordinary bookwork and problems. Following the rule of easiest first, do the bookwork, and then you will come to the problems, freshened with the comfortable feeling that at any rate you have done half —enough to get you through. As to the former, always give the neatest proof you know, taking care, however, not to sacrifice correctness to conciseness. As to the latter, you may nearly always obtain a hint how to start by referring to the previous question. In all Cambridge and most London papers, at any rate, this is so, for every problem that is set is attached to the piece of bookwork on which it depends. If this clue fails to lead to any very definite result, do not despair. There are very few problems incapable of being ultimately hammered out, if you only have patience enough. These few you may usually leave, relying on the hope that most other people will be forced to adopt the same plan. There *is* a sort of intuition which enables one to perceive in a moment what course is likely to bring a problem out, but to acquire this needs much practice. Geniuses may consider themselves able to see through any problem in the elementary branches, Algebra, etc., up to and inclusive of Differential Calculus, when they have worked say fifteen thousand problems in these subjects. Not to be disappointed, ordinary people should multiply this number by ten. This seems a Herculean task, but I think that no one who has thoroughly considered the point will set it down as Quixotic. Even if mathematics are not to be converted into tools for winning bread, they supply a finer and more complete discipline to the mind than any other branch of learning, forming, in addition to this, a pleasant companion for leisure hours, a plaything when we stand in need of rest from work, and an inexhaustible field for curious research.

As to the work previous to the examination in mathematics, the student will find enough problem-exercise in Wolstenholme,[1] or in some more elementary manuals. To get the text-books up, I would recommend the plan of keeping three note-books. After reading a chapter over and thoroughly digesting it, write in the first note-book a summary of those proofs which you think you will find any difficulty in remembering, giving especial prominence to the 'catchy' points. In the second, *summarize* the more important *results*, and *commit this to memory*. After this, work through the whole of the examples you find out at the end of the chapter; and if you come to any which, after having done them, you think of such a nature that you would fail to do them six months hence without a great amount of labour, write the solutions to these in the third book. If in this you persevere in Sisyphus fashion, you will find that you are gradually attaining that skill which you once so demonstrably lacked, and finally the stone of your difficulties will rest on the top of the hill.

[1] Wolstenholme's *Mathematical Problems*. London, 1879. Macmillan.

In the classical papers, translation at sight takes the place of problems, requiring, in its turn, a vast amount of practice before success can be hoped for. Cicero's *Orations*, Cæsar, Livy, Vergil, Ovid, are easy Latin exercises; Xenophon, Homer, and Sophokles correspondingly easy Greek ones. Tacitus, Æschylus, and Demosthenes will do well for more advanced reading. It is very imperative that the grammar, as the framework of the whole, should be thoroughly mastered. In reading a work, the fresh words you meet with are of little importance, for you may never see them again; but the grammar and syntax will be constantly recurring, and are of infinite value. An eminent professor at one of the Universities makes it a rule, when reading Cicero, to 'look out' only the words which he knows, or rather thinks he knows. Others might follow the professor with advantage to themselves.

In English papers try to summarize, because there are few cases in which you will have too much time. Add every date you can think of in history. If the examiner is an author, get his book at your fingers' ends, and then quote him as an authority five or six times. But after all these things are done, this is a branch in which nothing but sterling knowledge can avail, and you should bend all your endeavours to the apparently unimportant subjects of history, grammar, etc. Time spent on these always repays with interest.

There is never too much time for a paper. Some men are very fond of thinking that they know twice as well as the examiner how much time is really required. You will do such wiseacres no great injustice if, when looking on the list for their names, you commence your search at the bottom. The examiners mean every minute of the time they allow to be employed in honest hard work.

But the arithmetical genius thinks that the two hours given to Preliminary Arithmetic in the Junior Oxford, say, were meant, not for him, but for dullards. Such geniuses I have known deliver up their papers fifteen or twenty minutes after the commencement, and think they have done a very clever thing. And then the geniuses reflect, compare answers with a plodder who has sat out the two hours, and discover omission after omission, and finally that the plodder is completely victorious. The old tale of Hare *v.* Tortoise is far truer than geniuses care to acknowledge.

Read everything; read it afresh; work out your results independently again and again, till the papers are called for, and then you may pride yourself on having taken all the precautions in your power to overcome all kinds of geniuses.

Never compare answers. It cannot alter them. It can only make you discouraged by continual wishes that you had written this or omitted that. But after

the examination is all over, when it won't do any harm to shed a few tears on the subject, you cannot do better than refer to the book and learn up the parts in which you have proved yourself deficient.

The commonplaces of advice are too well known to need more than a mere mention—namely, attention to punctuation, spelling, writing, dotting of *i's*, etc. These said commonplaces will probably be presented to you in a printed form during the examination. You may follow most of them, not all. You may be told to answer the questions in the order they are set. This piece of advice you may studiously neglect, and do no great harm to your prospects. *If there is plenty of time*, you may be exact in punctuation, write in 'copy-book hand,' be careful about the arrangement, take great pains in English grammar, and expatiate to any degree on your pet theories or those of your friends. Under similar circumstances only may you enhance the charm or lessen the dulness of your answers by flowing epithets or learnedly-erratic disquisitions. But when you see that you will only just have time, crowd all sail in right good earnest. Never mind the commas; the facts are more important. Leave the 'copy-book hand' to other and calmer moments; write as fast as ever you can. Never expatiate, but try to present everything in a *tabular* form, so that the examiner, even if bothered by the lack of good spelling, or by the mannerisms of the writer and writing, may be cheered by your evident desire to please him and save his time: and remember always that *matter* is a more desirable thing than *manner*, and thoroughness the *summum bonum* of educational work.

But one final caution. Do not carry these liberties too far. Even examiners are human. Even a classical man, accustomed to Pindar, might be horrified at sentences four pages long, with not a single stop or dot from beginning to end. Even a great scholar, able to face his own writing, and most great scholars are bad writers, might be disturbed at the sight of the worst efforts of your hand. And it is highly probable that not many marks would be assigned to an illegible answer, even if written with more than ordinary skill. Remember that an examiner may have two or three thousand papers to read through, and is not particularly in love with you, and likely to pardon all your delinquencies; that they have tempers to lose and good graces to win; and that the best way to win them is not by writing hieroglyphics, which you yourself could not read an hour after their creation.

One youth of my acquaintance was not perfect in the art of caligraphy—in fact, his writing was so execrably bad that it was irreverently compared to the work of a spider with an inked foot crawling over a sheet of white paper. A change for the better in this brought about a decided improvement in examination results. Spiderly writing never prospers.

'How I teach Arithmetic.'

BY WILLIAM SPENCER.

Author of 'Spencer's Exercises in Arithmetic.'

THE first query that presents itself to my mind in commencing this article is, as to whether I shall place it in inverted commas. As the title is not of my own choosing, I decide in the affirmative. This title will necessitate the use of the first personal pronoun; and as the writer prefers the singular number to the editorial 'we,' consequently, although the article will be somewhat egotistic, yet it is hoped that this characteristic will be more applicable in its literal than in its conventional meaning. Beside the title of my paper being furnished to me, I am further instructed that it is 'to be simply a description, such as you would give to a young teacher, of how this subject is taught throughout the school.' I am still further instructed to 'treat the subject fully, from the time you first teach the youngest child to count or add, till he leaves you, including Mental Arithmetic.' I shall presume that 'leaves you' implies rather when he *ought* to leave, that is, when he becomes a fairly proficient arithmetician, being able to work higher arithmetic generally, including Percentages in their many phases of Interest, Discount, Stocks, etc. As my paper is not a treatise on Arithmetic either as a science or an art, on both of which views much has been and still could be said, I shall not discuss its merits from either an educative or a utilitarian point of view, but at once proceed in strict accordance with my heading.

It is necessary to premise that my school, which is a mixed one, has an average daily attendance of about 260 (80 girls and 180 boys), and that the limit of age is from six to fourteen, a small number being under or over this limit occasionally. The school staff consists of head master, second master, three pupil teachers, two stipendiary monitors who teach each half the day, and two other paid monitors who each teach half the day. The school is divided into six classes, the sixth class—there being no infant school in connection—consisting of children below Standard work, and the weaker candidates for the First Standard. The number in this class, which is generally the smallest in the school, varies—more than any other class—from 20 to 40, and always occupies a small classroom. The other five classes are not very dissimilar in numbers; the first class is, however, always the largest, and the fifth class generally the next in size.

The majority of the children when admitted to the sixth class have little, and some scarcely any, notion of number, a few having absolutely none. I will begin with zero, taking 6 or 10 or any number of children that are in this state. I commence with a small number of visible and *tangible* objects—fingers, marbles, balls, etc. The *names* of numbers and their *consecutive order* up to 10 or 20 have generally been picked up at home or elsewhere, but these names are often mere sounds conveying no idea of any concrete number. Now by means of objects connect the name with a concrete idea in the child's mind: *one* ball, *two* balls, *three* fingers, *four* marbles, etc. The various degrees of progress in the First Standard may be conveniently arranged under the following stages:—

(*a*) Add and subtract concrete numbers up to 10. Here I let the children not only see the objects, but actually touch or handle them, as with young children of slow perception it is not always an undoubted fact that 'seeing is believing.' I would here remark that I prefer children learning by observation rather than by committing to memory any addition or subtraction table, being convinced that as the latter relies on memory alone, more errors will be made in practice than by the former method. Examples of procedure:—1 and 1, 1 from 2, 2 and 1, 1 from 3, 2 from

3, 4 and 3, 4 from 7, 3 from 7, 8 and 2, 2 and 8, 2 from 10, 8 from 10; 4 and 4, 4 and 5, 4 and 6, 5 and 5, 5 and 4, 5 and 3, 5 and 2, and every possible combination of two numbers that make 10, or of deductions from any number up to 10.

(*b*) Add and subtract *abstract* numbers up to 10. Here at the beginning concrete numbers are *referred to*, but they are not visible, thus bringing the imagination to work:—5 apples and 3 apples, 6 balls from 10 balls, etc. At this stage, children are required to put their hands behind them, and sometimes even to close their eyes, so as to make the process purely mental. *Mental* effort requires much encouraging: many young children, like some of larger growth, much prefer to use their senses to unaided thought. Hence you will sometimes see a boy in the higher Standards, even the Sixth, counting his fingers—a practice to be discouraged, as I generally find it is at once the result and a proof of mental laziness. Gradually make the numbers purely abstract:—6 and 4, 4 and 6, 4 from 10, 6 from 10; 7 from 10, 5 from 10, etc.

(*c*) Putting down and adding and subtracting *units* up to 10. Here, as in every subsequent stage, let the black-board be in constant requisition. Place the numbers (figures) under each other in a column which will amount to any sum not exceeding 10. We will assume that the children having had some practice in making figures, know all the digits, also the number 10 at sight. Examples for addition placed *over* each other:—3, 2, 1, 3; 4, 0, 3, 1; 5, 1, 2, 2; 3, 5, 0, 1, etc. For subtraction, *over* each other:—8—4, 9—2, 10—8, 7—3, 6—6, etc. After seeing a score of such done on the board, let the children do them from dictation on their slates. Here the child takes the first step in putting down numbers for himself, really the first step in arithmetic other than mental. Here attend to the character of the figures for neatness and shape, as well as to accuracy of result.

(*d*) Extend the above three stages up to the numbers 30 or 50. The concrete should not now be too much relied on, but still for children who have a strong faculty for the real (*res*), it will still be of service occasionally. Give plenty of examples, first on the board, then on slates. First in addition, where there is no 'carrying:' 12 and 23, 3+16+10, 21+11+4+3, etc. Then in subtraction: 38—23, 35—13, 48—36, 29—16, etc.

(*e*) Commit to memory the tables 2, 3, 4, and 5 times up to 10 each,—as far as 5 times 10. Illustrate by marks on the board; *e.g.* that twice 3 are 6, by making two groups of three strokes each, and then counting them to show that they make 6; that two groups of 4 each make 8, etc. I encourage the children to get them off at home, as it saves time and *noise* at school, it being difficult, if not harsh, or even cruel, to compel *young* children to commit anything to memory silently. Much testing is required to see that they know them accurately. Care is required that they can bear any amount of cross-questioning in them, and not simply able to gabble them consecutively. Examples:—5 times 3, 5 times 7, 3 sixes, 4 nines, twice 8, twice 6, etc. Ask a child a dozen or a score such questions; if he answers every one, he may be considered safe, but if he makes but one blunder in twenty questions, he must be further drilled in them. When the blunders are but few, and have got partly fixed in the child's memory, correct them in large figures on the board, and cause them to be repeated several times aloud by the children. The two most common errors I have found during many years, and still find, are—4 nines are 32, and 7 nines are 56. I have tried to account for these errors, but never could satisfactorily to my own mind.

(*f*) Practise oral drilling in *easy* short division. Examples:—How many fours are in 9, fives in 12, fives in 26, fours in 23, etc. Here concrete numbers may again be resorted to, till abstract ideas are gradually educed from them. These questions may be very advantageously mingled with questions in multiplication, as in last stage. At this stage also the cleverer children might be drilled in tens and scores up to 100; as, 2 tens, 3 tens, 5 tens, 9 tens, 10 tens, etc. Explain the import of the words 'twenty' (2 tens), 'forty' (4 tens), etc.—that the 'ty' implies ten. Also here, if not previously, I explain the 'teens,'—fourteen (4 and 10), fifteen (5 and 10), etc. Show that the 'ty' is *multiplied* by the previous part of the word to which it is affixed, and that the 'teen' (ten) is *added* to it. Then reckon twenties up to 100: 2 twenties, 3 twenties, 4 twenties, 5 twenties. Some notion of what 100 really is may be given from the balls in the frame, scholars in the school or in certain classes, ten children all holding up together their fingers, etc.

(*g*) I now teach Numeration and Notation up to 999. This subject is so thoroughly exhausted in every treatise on school management, that it is needless to go into detail here. Show that hundreds (below 1000) always require three figures, and that tens ('ty') require only two. Numeration should of course always precede Notation, it being easier to read off a number presented to the eye than to write it down in figures when dictated. Great care here will prevent much incorrect Notation in higher numbers. A thousand (1000) might now be represented, as it is the present required limit for the First Standard.

(*h*) Add and subtract numbers up to hundreds. First where no 'carrying' is required:—

231	201		
413	422	496	874
222	113	234	530
103	240		
969	976	262	344

Here it is necessary to explain the nature and use of the cipher, as, though being of no numerical value in itself, it is required to keep the other figures in their proper relative positions; so that each figure may correctly express what it is intended to do. Caution the children against calling the cipher 'ten,' as they are sometimes apt to do. We now enter upon the somewhat difficult task of 'carrying,' which may be illustrated in the working of the following examples:—

975		
758	459	604
746	284	278
804		
3283	175	326

I am aware that the process of carrying is differently taught, according as to whether its principle is fully explained, or only partially explained, or entirely

ignored. I adopt the medium course, explaining the above examples as follows. First add up the units' column, which comes to 23. I now put down the two figures (23) under the 04. Now show that the 2 must be added up with the tens' column, which amounts to 18. I now rub out the 2 to make room for the 8, placing the 1 under the 8 in the next (hundreds') column. The hundreds' column comes to 32, which we place to the left of the 83, having removed the 1 (temporarily inserted) to give place for the 2. Or, more shortly, the first column amounting to 23, put down the 3 and carry the 2 tens. In the second column put down the 8 and carry the 1 ten. I do not puzzle the children by calling these 18 *tens* = 180, but leave such remarks to be *incidentally* given, rather than formally taught, at more advanced stages. In subtracting the tens in the second example—8 from 5 we cannot; adding 10 to the 5 we have 15, 8 from which leaves 7. In carrying 1, I prefer in practice adding it to the 2 rather than diminishing the 4 by 1, the latter of course being more correct in theory, but I have found the former more successful in results.

As an experiment I tried the latter plan (diminishing the minuend) for about five years, but some years ago I reverted to the plan I had adopted during many years previous to the experiment. The chief difficulty was in working such cases as in the tens column in the third example above. The upper figure being 0, it cannot be diminished, and the true principle of taking 10 from the hundreds' column and then diminishing *it* (the 10) by 1, I consider too intricate for a child to easily grasp with his present limited attainments. Beside the above difficulty, there is the initial difficulty of 'borrowing' 10 from the 0.

I have observed the three following errors in working subtraction, which require to be specially guarded against:—(1) Taking the upper figure from the lower when the lower was the greater, instead of adding 10. (2) Forgetting to 'carry' 1. (3) Neglecting to *effectually* carry, as in the tens column of the last sum above; although the child says '1 and 7 are 8, 8 from 0 I can't, add 10,' he then says '*seven* from 10,' forgetting that he carried 1, or had to do so. While adding 10 to the cipher, he forgets he has added 1 to the seven: here special care is required. Here also commit to memory the tables up to 6 times 12.

The various steps required for the First Standard of the Government Code have now been *taught*, but the important question is, Have they been *learnt*? A considerable number of the slower children will still require weeks or months of patient drilling and practising before they can do the work accurately and quickly. *Accuracy* here should be specially encouraged, while *quickness* (or at least *hurry*) should rather be discouraged,—the latter will be attained by repeated practice.

At this stage of a child's progress, or earlier, depending on various circumstances—such as age, reading ability, general intelligence, length of time before inspection, etc.—he is removed to the fifth class, which consists of fifty or sixty children, occupying a gallery in the schoolroom. For the first six months or more after inspection this class consists of children who will, at the next inspection, be examined in the First or Second Standards. Here the tyro is made more proficient by seeing scores of examples worked out on the board, and by working on his slate. The sums he works are either (*a*) dictated, (*b*) set on the black-board, or (*c*) worked from cards ('Addition and Subtraction' from my own *Working Series of Exercises in Arithmetic*). I may here observe that, except during the quarter immediately preceding the inspection, little regard is paid as to what Standard a child will be examined in. A boy may be working compound rules and reduction of money who will only be examined in the Second Standard; and on the contrary, another boy who will be examined in the same Standard, having just pulled through the First, may still be working chiefly at addition and subtraction. It is unjust to give ten times the attention to a few slow-coaches that is given to the culture of the average, or of the few brighter intellects. These backward ones get *more* than their average share of attention, but the idol 'percentage of passes' is not slavishly worshipped.

I will now try to show the various steps in teaching this fifth class, premising that for arithmetic it is divided into an upper and a lower division, the latter being again often subdivided into (*a*) and (*b*). At times the whole class work together, especially for explanations, illustrations, and the working of copious examples on the board; and at other times the divisions work separately. (*a*) Multiply by numbers 2 to 6. Show that multiplication is a short method of doing a *certain kind* of addition—that is, reckoning the *same* number a given number of times. Take 368 and show that by putting it down three times and then adding them together we get the same result as multiplying it by 3, and that the mode of carrying is the same in both processes. I find multiplication much more easily learnt than subtraction, so that this step is soon taken when the tables are well known. (*b*) Commit to memory, chiefly as home lessons, the tables up to 12 times 12, and practise them as in (*a*). Here a great deal of cross-questioning is resorted to—hundreds of questions in all conceivable forms: 4 times 9, 7 eights, 8 sevens, 6 nines, 9 sixes, 3 twelves, 12 threes, etc. Show that 6 eights, for instance, and 8 sixes are the same, so that if not known when presented in one form, the child may be able to present it to himself in the other form. As the table becomes known, we drill well orally in questions in division: 5's in 20, 9's in 29, 7's in 38, 12's in 51, etc. Here I find progress very slow at first, and much help and simplifying required. Take 7's in 31; here a child at first flounders about bewildered, perhaps running over in his mind, or rather *memory*, *any* combination of numbers: 3 eights, 5 nines, 7 sixes, etc. Or he says to himself, *seven* 8's, *seven* 5's, *seven* 4's, etc. Here point out that he is presenting the question to his mind in the inverted form, as he does not want to know how many eights, fives, or fours there are in 31, but how many *sevens* there are. I ask him to try *any* number of sevens, and after much hesitation (not *thought* generally) he will perhaps say 8. Now show him that 8 sevens are 56, and that it much exceeds 31. Shall we now try more than eight, or less? He will now most probably try 7—still too much, he sees. He might now be allowed to run down by 6 and 5 to 4, which he would do of his own inclination; or, finding that 7 sevens is *far* too much, he might be induced to try a *much* less number. Suppose he tries *three* sevens—too few. At last he gets to *four* sevens are 28, and as five sevens are above 31, the true result

may now be got from him. Here 'line upon line' is required, as I find many children who are quite *au fait* in the whole of the table, however presented, who still require months of continuous drilling before they are proficient here. (*c*) Now, if not previously, teach Numeration and Notation to tens of thousands. I first give some idea of a thousand: 100 boys having each 10 marbles would amount to 1000 marbles, and 100 boys having 100 each to 10,000. Other illustrations are also plentifully given, as they are always found to well repay the labour bestowed; in numbers, a child relying more on his memory than on his imagination, he naturally eliminates the concrete. Having put down 3769, I cover the 3 with my hand, and the children read out the 769. Having just given some notion of 1000 and the figures by which it is represented, I elicit that the 3 represents 3000. Show that hundreds only never require *more* than three figures, and that thousands never require *less* than four figures. The board is now freely used in putting down numbers containing units of thousands. As I proceed I distribute ciphers liberally among the figures, till any number of four figures is quickly read out. Now proceed to tens of thousands, concerning which no further remarks are required, except that as the thousands now require two figures, there will be five figures in all. The process of notation is much simplified to a child's mind if he be taught to insert a comma between the hundreds and the thousands—40,609.

(*d*) We now proceed to work multiplication of two or more figures. Having multiplied by the units' figure, show that in commencing to multiply by the tens' figure the first figure of the product is placed under the tens' figure of the line just obtained, or that it is placed perpendicularly under the figure by which you are multiplying, which, as it holds good whatever power the multiplier may be, I try to impress well. Here it is necessary to cause each figure to be placed in its proper position, so that there may be no difficulty or error in adding the lines together. I do not here go much into the subtleties (to a child) of the decimal system of notation, for which there was a mania some twenty years ago, it being then strongly advocated that every step in the practical working of the simple rules even, should be accompanied *pari passu* with an exhaustive explanation of its theory.

As I have before observed, much of the theory of processes is incidentally taught by casual remarks when working on the board; and when a boy has obtained a fair amount of *practical* efficiency as an arithmetician, one or two lessons on the decimal and other scales of notation, with the theory of manipulation, can easily be given, and more easily comprehended than at each practical stage. Show here, if not previously, how to multiply by 10, or by any power or multiple of 10: 46×10, 870×1000, 78×40, 638×5000, etc.

(*e*) We now work easy short division, first liberally on the board, as with every other step in advance, and then on slates. As the children have been well drilled *orally*—see (*b*)—in exercises in division, the majority of them only require a comparatively short time to work such exercises satisfactorily. Division may here be shown to be a short method of subtraction; *e.g.* 6's in 26. Show that 6 could be taken successively 4 times from 26 and its consecutive remainders, leaving at least 2 as the remainder.

(*f*) We next work out *ad libitum*, on slates, exercises from addition to short division, to attain and also to test accuracy and rapidity of working. I will here give specimens of three lessons given on different days, each occupying about forty minutes.

(1) The following four sums are set on the board:—

(*a*)	760804	(*b*)	769237
	288467		65

(*c*) Subtract 73,408 from ninety-four thousand and twenty-one, then divide the remainder by eight.

(*d*) Multiply eighty-four thousand seven hundred and nine by 790, then divide what it comes to by 7.

The answers are examined by each passing his slate to his neighbour (not exchanging slates), after which the answers are called out, and the examiner of each slate puts a large cipher on each sum that is wrong, and a cross on each that is right. Slates are now passed back to the owners, and those who have four crosses (all right) are often allowed to go into the playground for a few minutes, while the sums are worked out for all who have one or more wrong. Other four similar or somewhat dissimilar sums are now set, and those who have the whole eight right—or seven, or six, according to circumstances—now work from cards (my own Exercises in 'Simple Multiplication and Division'). The answers are generally called to one or more temporary monitors from a higher class. So the lesson would be continued till the time expires, the poorer ones still working from the board and standing on the floor, while the better workers are successively sent to work from cards at their place in the desks.

(2) Another lesson might be as follows, all the sums being dictated instead of being set on the board. Example: Multiply 86,409 by 83, then divide the product by 9. The answer being called, each holds up his hand who has it right. Here much care and some delicacy are required, that every hand held up is honestly so; in each case a few of those said to be right being glanced at by the teacher, and a suspicious one now and then carefully examined. In this respect my theory is, that honesty fears no scrutiny, and dishonesty needs it. Another example might be: Take 36,409 from 71,080, multiply the remainder by 409, and then divide the result by 9. Here care is taken that the specific terms 'sum,' 'product,' etc., and the generic term 'result,' etc. are clearly understood, being repeatedly defined. When such sums as the last are given, being rather long, each might show his working when done, and go out if right, those who are wrong trying again and again till a reasonable time has been given. When children work the same sum while standing on the floor, great facilities for copying present themselves; but when each child is culled out as he is right, the chances of successful copying are much diminished, copiers being generally slow, while the quicker ones are soon right and off. In order not to send out too often those who are right, another sum would be dictated or set on the board for them while the teacher is doing the previous sum for those who were wrong. In this manner the whole of the forty minutes for the lesson is occupied, some ten or twelve sums being given in the time.

(3) Another lesson would be working *entirely* from cards (Multiplication and Division). Procedure:

—Give each a card, all standing on the floor, and tell them to do 2, or 3, or 4 sums, as the teacher thinks proper, and then go to their seats and do the remainder of the card. As there are eight sums on each of these cards, the slower ones would seldom do the last sums on the card, hence each is often told to do (say) the 2d, 4th, and 7th sums before doing the others. Here see that each does the specific sums he was told to do. Or they may be told to begin at the *last* sum and work upwards to the first; or again, before much proficiency is attained, some choice might be allowed; say, 'Do any three sums out of the first four,' or 'any two out of the last four,' etc. As some selection is often, or perhaps generally, allowed to adults in examination questions, the same privilege may often be advantageously granted to children; as, though a child should be encouraged to attack difficulties, it is unwise to keep him too long attempting what is to him impossible. Some of the quicker ones at this lesson will do 4 or 5 cards—30 or 40 sums; while several of the slower ones have not got through one card, and perhaps two or three have not done those required while standing. The first card given in this lesson might be in addition and subtraction, and the subsequent ones multiplication and division.

As before observed, the easier stages in multiplication and division are taught in the fifth class, and the more advanced stages in the fourth class, to which we now turn our attention. We here take up long division to complete the teaching of the simple rules. I first do a *short* division, say by 7 or 9, by the ordinary method, and then do it by the long method, and notice that the result is the same in each case. Divide also by any of the *teens* by both methods, which, however, we ordinarily work by the short method, as saving in time and space for working. Now take a greater divisor and show that it is difficult to do by the short method. Example: Divide 91,876 by 37. Here let the children see clearly what we are going to do,—to see how many times 37 will go in 91,876. I illustrate by supposing that we have 91,876 nuts to put equally into 37 bags, and that we wish to know how many must be put into each bag. Having placed the numbers in position for working, we proceed—

```
37)91876(2483 nuts in each bag.
   74
   ---
   178
   148
   ---
    307
    296
    ---
     116
     111
     ---
       5 nuts over.
```

There being no 37's in 9, we must take 91: 'How many 37's in 91?' Here I observe great diversity in the children's ability to answer. A sharp boy from previous drilling in mental arithmetic will reply: '2 and 17 over,' while the most stolid are utterly nonplussed. Having, after many remarks and questions, elicited that there are less than 3, we put 2 in the quotient. In multiplying by the 2, we place it under the divisor, till a little expertness in multiplying by a figure placed at a distance is attained. Having taken the 74 (which show clearly to the dullest child is twice 37) from 91, we have 17 left. As before remarked, several having worked it purely mentally, know that it is so far correct. Here it might be remarked to the children, that if all processes could be worked mentally and *remembered* as we go along, we should not require slates or paper to work on, and that these appliances are simply aids to the memory in long calculations. Now 37's in 178. This number is nearly twice as large as the previous one, 91, and more than twice as large as 74, which is twice 37. After considering the 178 in various phases, and with comparisons with what we have already done, the majority of a class will see that it must go 4 *or* 5 times. Try 5 times: 5 times 37 are 185, but the number we have is only 178; hence we see that it will not go 5 times. We now try 4 times, though a mentally lazy and inattentive boy would be as likely to say 'try *six*.' I would note here the difficulty of teaching a child who is mentally lazy, this laziness being often in inverse ratio to the amount of physical activity he can display. His bodily eye may see all you do, and you may congratulate yourself that he is really performing mentally the process going on before his eyes; but you are frequently wofully mistaken, as a little close questioning will convince you. Simple inattention, though trying to young teachers especially, may be more easily and successfully grappled with; but mental inactivity requires the teacher to be alert with countless devices to overcome it. Having taken 4 times 37 (148) from 178, we have 30 left. Now 37's in 307. This is much larger than either of the two previous numbers. Try 7 times, = 259, which, taken from 307, leaves 48. 'Will it go 7?' 'Yes;' 'No.' The more intelligent say, 'It will go more;' 'it will go 8.' Now show that we want to get *all* the complete 37's there are in 307;—we have taken 7, and there are 48 left; but there's another 37 in the 48, hence we get 8 times and 11 over. After trying 7 times with the 48 remainder, caution the children against saying it will now go once, and putting the 1 in the quotient after the 7; show that we must rub out all after the 307 and begin *de novo*. Now finish in the same manner, whatever the length of the sum, and show clearly what result we have got. We wanted to know how many nuts must be put equally into *each* of 37 bags, so that the bags may contain in all 91,876 nuts. We have found that each bag must contain 2483 nuts, and there are 5 nuts over—not another for *each* of the 37 bags. Explain well till the answer is clearly understood,—that we have found out what we really wanted to know—how many nuts for each bag.

At this stage the Pence Table is committed to memory, being extended to 1200 pence, and is much used in mental arithmetic in the more advanced stages. The mental arithmetic in this class (fourth) consists in drilling in larger simple numbers, in the Pence Table, and in easy prices of articles. The following are a few specimens of questions in a lesson in mental arithmetic here:—3 times 16, twice 48, twice 96, 192d.? 4 times 17, 3 times 68, 3 times 204, 612d.? £2, 19s. 4d. is how much short of £5? How much is 270d., 370d., 470d., 670d., 870d., etc.? 285d., 421d., 377d., 613d., 205d., 981d., 1080d., etc.?

How many fifteens in 100, in 183, in 200, etc.? 16's in 83, in 147, in 190, etc.? 5 lb. of beef at 9d. a lb., 6 lb. at 8½d., 10 lb. at 9½d., 15 lb. at 10½d., etc.? 4 lb. of butter at 11¼d., 6 lb. at 1s. 2d., 9 lb. at 1s. 3d., 10 lb. at 1s. 2½d., etc.?

Having now gone through the *teaching* of the whole of the simple rules, a variety of exercises in *all* the simple rules, from addition to long division, is now given daily for some weeks or months,—from dictation, from the board, and from cards. Numeration and Notation are now extended to millions, the figures being carefully divided from the right by commas into groups of three figures each; thus, 80,071,040.

(*To be continued.*)

'How I teach Writing.'

BY JOSEPH COX,

Author of 'Practical Standard Copy-Books.'

WRITING consists in reproducing in ever-varying combinations a few elements. It renders effectual aid in the earlier stages of reading, and is an indispensable instrument in the acquisition of correct spelling; whilst it cultivates the eye, the hand, and the judgment, and is frequently the sole index, in the eyes of the parent, of the progress of his child.

The qualities of good writing are legibility, rapidity, and beauty. The more it is sloped, the less legible it becomes; and the more upright, the less rapid is the execution. There is a general tendency to slope it too much.

Let us suppose that we have before us a class of young children unable to write. What has to be taught? An alphabet consisting of twenty-six letters. But as each of these letters has two entirely distinct forms, capital and small, there are fifty-two letters to each. How can they best be taught? Take the small letters first, as they are learned the more easily. Can they be associated—arranged in groups, the letters in each group having something in common with that group? Evidently they may.

Before commencing work with the class, each scholar should be supplied with a sharpened pencil inserted in a pencil-holder, and slates of a good size ruled on one side with double lines about three-quarters of an inch apart, *and then a third line midway between the outer lines.* All these lines should be distinct and indelible. Similar lines should be ruled on the blackboard, of course farther apart than those on the slates. If possible, all the classes writing on slates should have desk accommodation.

I.—WRITING ON SLATE.

(*a*) **Small Letters.**—*Group* 1: *n, m, r, v.*—All the script characters are made up of *strokes* and *curves.* If these be well taught separately, and then the mode of joining them, we shall obtain good writing. The importance of *the third or middle line* will now be apparent. The making of straight strokes on slate, being so easy, may be dispensed with, and we can then at once proceed to teach the curve. Secure the attention of the class, and then commence *on the middle line* of the first set of lines on the blackboard and proceed to the top line, *exactly touching it,* making a good round curve, and then bringing the down stroke to the bottom line, thus forming the first part of the letter *n.* To excite the interest of the class and impress more vividly on their minds how it was made, call several children out and tell them to make one like it on the blackboard. They may then be allowed to make one for themselves, the teacher first carefully showing them how to hold their pencils. Great care should be taken to secure the making of a good curve, the teacher going round to each child and helping all unable to make one by taking hold of their hand and steadying it. All misshapen curves should be rubbed out, and another attempt made. Several more curves may then be made, all in one line. The almost general fault will be, making the curves too narrow and even pointed, failing to make them of uniform width, and either going above the top line or not touching the top and bottom line. To secure the making of curves of uniform width, the teacher should turn the slate upside down, and the child will then readily see which curves are too narrow; the child should afterwards be encouraged to do this for himself. A few curves of uneven width might also be written on the blackboard, the children being asked to point out the faults. Other curves might then be formed on the blackboard, some of them not exactly touching the top or bottom line, and the children's criticism asked on them.

The first lesson might well be spent in teaching the curve, the teacher throughout paying great attention to three points—(1) that all the pencils are held properly; (2) that all the curves are bold and round, and exactly touch the top and bottom line, none going above it; and (3) that each stroke be brought down to the bottom line and exactly touch it, while not going below it.

The second lesson might then be spent in teaching the second part of the letter *n.* Commence on the middle line of the blackboard, go up to the top line, make a good bold round curve touching the top line, as in the first lesson, and then bring the stroke down to the bottom line, forming another similar curve and finishing it on the middle line. The teacher should carefully see, throughout the lesson, to the three points mentioned above, giving careful *individual* attention to all the class. Let his motto at all these early stages be, 'Hasten slowly,' seeing that every *detail* is carefully carried out. As soon as each new copy is written on the board, at this as well as all subsequent stages, call on the class to give the name of the letter or word. The remainder of this lesson might then be occupied in teaching the letter *n* by joining the two parts already taught. The other letters of this group, viz. *m, r, v,* should be taught in the same manner, one lesson being spent on each, and in revising former lessons.

Group 2: *i, u, w, e.*—First teach the straight stroke and curve of the *i,* showing the class that it is merely the first part of the letter *n* turned upside down. Then teach them how to join the up-stroke to the *i, on the middle line.* The *u* and *w* will naturally follow, pointing out that the loop of the *e* should be commenced on the middle line and great care taken to have it properly formed. Form easy words such as *we* from this group.

Group 3: *l, b, t.*—In making the *l,* commence the same distance above the top line as the first and third lines are apart (three-quarters of an inch), and make the down-stroke and then a good curve ending on the middle line. Next join the up-stroke of the *l* to it on

the top line. The *t* should only go half the distance above the top line as the *l* and *b*, and should be crossed midway between the top of the *t* and the top line. Then form easy words into which the letters of this group enter.

Group 4: *h, k, p.*—Care must be taken in making the curves of the *h* and *k* to see that all the class make the *top* curves of the same width as the bottom ones. Let them turn slates upside down and compare the width. The up-strokes of these letters should be joined on the top line, but the curves should join the down-stroke *on the middle line.*

Group 5: *j, y, z, f.*—The loops of all these letters should go as far below the line as the *l* and *b* above the line. Great care should be taken in getting well-formed loops.

Group 6: *c, o, a, d, g, q.*—This group consists of the *o* and its combinations. The *c* is taken first to prepare the way for making the *o*. In making the *o*, insist on the class commencing it *on the middle line, not* on the top line, and see that it is made sufficiently round and carefully joined. Next make the *o* into an *a*, pointing out most particularly that the down-stroke is commenced *on the top line* and *not* at the middle of the *o*; the down-stroke to touch the *o*, *but not to cut it.* Having taught the group, form words from it such as *dog.*

Group 7: *s* and *x.*—The *s* will require careful teaching, the teacher seeing that it is made wide enough, and that the dot is brought round to the up-stroke. The *x* merely consists of an inverted *c* united to a second *c* in its natural position.

(*b*) **Capital Letters.**—These may all be conveniently arranged in four groups, and they may be written within the rules already ruled for the small letters.

Group 1: *C, E, L, S, G, H, K.*—*C* is more easily made than any other letter; then follow the other letters *having the loop* like the *C*. Take special pains in getting a good curve for the *C*, as there are only six capital letters in which the curve does not occur. See that all the letters touch the top and bottom lines, except, of course, the bottom loop of the *G*.

Group 2: *Q, V, Y, Z, X, O.*—The curves are made to fill the two top lines—a good guide for little children, and easily imitated. See that the curves are all bold and round, and of uniform size.

Group 3: *I, J, T, F, A, N, M, W.*—The down-stroke and the curve of the *J* should be taught first; then the top of the letter could be added, as this method is easier for very young children.

Group 4: *P, B, R, D.*—These four letters are all similar in construction, and will naturally follow each other. To prevent confusion between the capital and small letters, occasionally write them side by side on the blackboard, thus: *A, a; B, b;* and let the children read them aloud and afterwards write them on their slates; then require them to be written from memory; and, for the sake of variety, a whole word in capital letters, or words beginning with capitals, may be dictated, the class making the capitals fill the three lines ruled for capital letters, and the small letters the two lower of the three, thus affording practice in *round* hand. The slates, as now ruled, can thus be used on one side for *large* hand without capitals, and for *round* hand, each word beginning with a capital. Nothing but constant practice will give *freedom. If the large and round hand are not carefully taught, the teacher will strive in vain to secure a bold small hand.*

(*c*) **Figures and Mode of setting down Sums.**—The figures on slate should be made a little larger than those on paper, so that the teacher may be able the more easily to point out defects, and also to give freedom to the work of the children. Here again the blackboard should be used. Teach the figures one by one on the blackboard, and insist on exact imitation by all the class. As there are so few figures to teach, a teacher who tolerates a slovenly style is without excuse. All the figures should be of the same size except the *7* and the *9*, which should be half as large again as the rest. The up-stroke of the *1* should join it at the top; the *2* should be made exactly like capital *Q*; the *3* open at the top and a well-formed curve at the bottom; the *4* a small loop at the tail, and then the line carried horizontally, the down-stroke cutting the horizontal line in the middle, and going as far below as above it; the *5* crossed at the top with a *straight* line and a good round curve at the bottom; the *6*, the curve half the length of the whole figure and the back slightly curved; the *7*, short down-stroke, then the curve taken from the middle of the down-stroke and the tail of the figure carried below the line of that part of the figure above the line; the *8* with a good curve at the top; the *9*, make a good *0 on* the line, *and the same size as the 8*, and then the tail as long as that of the *7*, giving a caution against the almost universal error of beginning *above* the cipher to make the tail. The figures having thus been taught in detail, practice should be given in setting down sums. Here the chief difficulty will be to get the children to put units exactly under units, tens under tens, etc. To overcome this difficulty, *and yet not puzzle the children with too many lines on their slates*, rule on all their slates a vertical line about an inch and a half from the right-hand side, and then draw with the chalk a similar line on the blackboard. Write the first line of figures on the blackboard, *placing the units on the vertical line*, and reminding them that all the figures must be of the same size, except the *7* and the *9*, and placed in a straight line across the slate, and well apart. Then in the second line of figures place the units on the vertical line under those in the first line, and the tens exactly under the tens in the first line, seeing that all the class keep the lines of tens and hundreds, etc., as straight as the line of units. When the sum is put down, let all the class rule the line separating the sum from the answer, taking care that the line does not touch any of the figures except the tails of the *7* and the *9*; draw the line a little beyond the figures on the left-hand side so that it may be level with the lines underlining the answer, and rule two lines under the answer *exactly* the same length as the one above the answer. A similar course is followed with the remaining sums, which are placed exactly under the first sum. Thus a very valuable training will be afforded *in preparing them to put their Arithmetic on paper.*

(*d*) **Small Hand and Transcription.**—Rule the other side of the slates with double lines about one-fifth of an inch apart. After the previous drill in large and round hand, we have now only to teach the letter *r* and the *five* loop letters which have not been already taught. Rule double lines on the blackboard with chalk, and commence on the bottom line with

the up-stroke of the *r*, carry it above the top line to make the dot of the *r*, then come down again to the top line and go straight along the line till you get the width of the *r*, then down to the bottom line again and make the curve of the *r*. In practice this method of teaching the *r* will be found extremely easy and effective. Next teach the five letters *l*, *b*, *h*, *k*, and *f*. Begin with the *l* as it is the easiest, and be careful to insist on all the class commencing the loop of the *l* *on the upper line, not* below it. The *b* will then easily follow, and the loop of the *h* and *k*. The next point of importance is to see the children commence the second part of the *h* and *k* *midway between the two double lines,* thus entirely preventing this part from running into the loop, which is a very common and ugly defect. As each letter is thus carefully taught, write the letter five or six times in a line on the blackboard and require the class to copy them, the teacher taking care that all the loops are of uniform length and width. Simple words may then be formed containing the loop letters, and the class write them, first from a copy on the blackboard, and then from dictation, the teacher carefully inspecting every slate and every letter. Special practice in writing the *r* and the loop letters, including not merely the five above but all those learnt before, such as the *g*, *y*, *j*, etc., should be given at stated intervals to keep the writing exact.

The next step will be for the teacher to select a short paragraph from the reading-book of the class and write it one word at a time on the blackboard, specially calling the attention of the class to the rule requiring that every sentence should begin with a capital letter. The class should show slates after writing each word, and the teacher carefully inspect each slate, pointing out misshapen letters and insisting on their correction *before he goes on to the next word.* Here again remember the injunction, 'Hasten slowly.' When an error is general, draw the attention of the whole class to it on the blackboard. Always require the children to repeat the word as soon as it is first written on the blackboard. When the short copy has been thus written one word at a time, turn the blackboard, tell the class to rub out the copy, give the children reading-books, tell them to copy the passage, and, when written, turn round the blackboard and let them compare their work with the copy, and see they make the necessary corrections, especially noticing the *spelling.* The common faults at this stage are: omission of small words and of final *s* and *d*; the substitution of one letter for another, as *n* for *m*; substitution of capital for small letters, and *vice versa*; neglect to join letters.

Transcription from reading-books without previous preparation will follow, *dictation* being, if possible, preceded by transcription. Thus transcription might be given as part of the Home Lesson for the previous night, but it should always be carefully examined, and mistakes written out by the children. The passage might then be given from dictation in school *after the following preparation.*

(*e*) **Dictation.**—If the class is very young, write the passage on the blackboard, and let the children spell all the difficult words together, and then singly; turn the blackboard, and ask them to spell one word at a time, or better still, let them write the words on their slates from dictation. In the higher classes, it would be sufficient to write the most difficult words on the blackboard, and spell them over with the class. The teacher should constantly bear in mind that as spelling is learnt mainly by the *eye*, to give a dictation lesson without due preparation is simply to confirm the bad spelling of the class, and thus do much harm. When thus carefully prepared, no scholar should have more than one or two mistakes in a piece of ordinary length.

Before commencing the dictation, the teacher should remind the class that *words* omitted, inserted, or substituted for another word, or *letters* omitted or added at the end of a word, will be considered errors: he should give directions respecting the *I* and the *O* when written alone; distance of words from each other (nearly a quarter of an inch); the use of capitals; leaving a margin on left-hand side of slate, etc. Then give out the first portion *twice*, slowly and distinctly, no scholar being allowed to begin writing until it is thus twice repeated, and if any one then fails to hear, to put up hand and ask, *but on no account* should they be allowed to omit words or fall behind the rest of the class. The children should always be carefully separated, *to make copying almost impossible.* Whilst the dictation is proceeding, a sharp eye should be kept on the class to detect the slightest attempt at copying, and to do this he should remain almost the whole time in front of the class, occasionally, however, going round to see that none are falling behind or doing careless work. Generally the writing of a dictation lesson is expected to be done as a model, but occasionally it is desirable to require them to write more quickly, especially in the higher classes.

Next comes the correction. Give the class a few sums to work, whilst the teacher, assisted by a few elder boys from the first class, examines each slate, and writes each word correctly over the misspelt word, which is then written out by the scholar a given number of times. When all the slates are examined, the teacher writes all the misspelt words on the blackboard, each syllable divided by a hyphen, and the class spell them together, pronouncing each syllable separately. The blackboard is then turned, and the words are dictated, all being now expected to write them correctly. All the slates are then shown, and the writing is criticised. A list of the misspelt words should be entered in a book, and dictated occasionally. The children in Standards I. and II. should always write between double lines.

II.—WRITING ON PAPER.

(*a*) **Copy-Books.**—It is of the utmost importance that the teacher should use a good series of copy-books. Some of the best published are the Public School Series, Line upon Line, and Vere Foster's. Nearly all the series commence with round instead of large hand. The writer of this paper has drawn up a series of copy-books, 'Practical Standard Copy-Books' (Hughes), on the system here advocated, and believing that it is of material service, especially to a young teacher, to know what books should be used at different stages of the learner's progress, he will now proceed to give such information.

Nos. 1, 2, 3 are all medium large hand, provided with the middle line to aid both the scholar and teacher, no letters being used in the copies which go above or below the line. Great stress is laid on a solid and uniform down-stroke; touching the top and the bottom line; the mode of forming the more diffi-

cult letters, such as the *e*, *o*, and *a*, by practical directions printed on the top of each page. These three books should be used until the scholars can make good down-strokes, and round, bold, and well-shapen letters. *No child should be allowed to have a copy-book until he can write a good large hand on slate.*

No. 4 consists of short common words in text hand, the middle line is dispensed with, and the letters, which go above and below the line, are systematically taught.

No. 5 is round hand, the copies consisting of common words, each of which commences with a capital. Special practice is given in making capitals. *Children should on no account be permitted to begin small hand until they can write the large and round hand well.*

Nos. 6, 7, and 8 are initiatory small hand in double lines. No. 6 first gives special practice in making the small hand *r*, and the *l*, *b*, *h*, *k*, and *f*; but the special feature of the book is the thorough *training given in setting down the Arithmetic of Standard II. on paper*, on the same plan as that described in the first part of this paper for working sums on slate.

No. 7 consists of narrative from Charles Kingsley, in double lines of the same width as No. 6; and No. 8 has double lines somewhat narrower than Nos. 6 and 7, but the distinctive feature is the *practice given in setting down the Arithmetic of Standard III.* Scholars should not be permitted to leave the double lines until they can write a firm and uniform hand.

Nos. 9 to 15 are single-lined small hand, the copies being narrative, grammatical, or geographical, in a good bold round hand, gradually decreasing in size as the higher numbers are reached. In these seven books a great variety of practice is afforded.

Mechanical aids in copy-books, when too numerous or too long continued, only cramp the handwriting: the double lines should be dispensed with as soon as the scholar can write an even and firm hand. If he begins to write a small, scratchy, uneven hand when using copy-books with single lines, he should be put back again into double lines for a time. When writing on single lines, the constant tendency is for the writing to become too small and uneven; the teacher should therefore insist on its being as large, and the down-strokes as thick as the copy. There is also a tendency to make the loop letters too short.

Copy-books are a good indication of the character of a school, hence H.M. Inspector is wisely required to see them at his annual examination.

(*b*) **Writing Lesson in Copy-Books.**—When the class is seated, arrange the children at equal distances in the desks, so as to give ample space to each, *placing the worst writers, and those who are writing for the first time on paper, in the front line*, so that extra help and superintendence may be given them. Then the class being supplied with pens and books, give the orders 'Open books,' 'Show pens,' holding their pens ready for writing, the teacher of course seeing that all the pens are held properly,—whether the fingers are placed too near the nib or too far away; pointing the pen across the room, and *not* at their next neighbour; holding it too upright, or too much inclined. Next give a glance at the position of the books on the desks; see that each scholar sits up a little to the *left* of his book, *not* exactly in front. Then give the order to begin writing by saying, 'First line,' cautioning them not to dip pens too deep, or shake out the ink on the furniture or the floor. Whilst they are writing, keep a special eye on the worst writers, and show the beginners how to hold their pens. Also watch the whole class, and check the tendency to sprawl with the left elbow across the desk, or to rest the left ear on the arm. The rapid writers should be checked, and the slow ones hastened a little. When the first line is written, the whole class should show books at the word of command. In inspecting the books, notice if any of the down-strokes have ragged edges, *or* are thin, whilst the bottom curves are thick; be sure such scholars have held their pens on one side, and see they hold them properly during the writing of the next line. *If any general faults are observed, they should be pointed out on the blackboard before the next line is written.*

Then give the order, 'Second line,' and whilst it is being written the teacher should get round the class *and mark all misshapen letters or other faults* with a lead pencil, or better still, a coloured pencil. If time permits, he should occasionally pencil out a few letters, and, in the case of beginners or very bad writers, steady and guide their hand to give them confidence, *but he should never sit down and write half a line or a line whilst the class is left to take care of itself.* The second line is then inspected like the first, the teacher pointing out the faults either to each individual scholar or on the blackboard, if necessary. The order for the next line is then given, and so on through the lesson, sometimes allowing them to write *two* lines at a time, the teacher keeping as much as possible in front of the class, and insisting on all sitting in the right posture, and holding pens properly, and yet not neglecting to go round the class at regular intervals to mark faults.

The common faults in writing large hand are not making uniformly thick down-strokes, the tendency being to make them too light, rarely too heavy, and not touching the top and bottom line. On the other hand, when first attempting small hand, the down-strokes are generally too heavy. The best writers, whose hands are already formed, should be allowed to copy poetry or prose from standard authors into their exercise books.

(*c*) **Dictation on Paper.**—The plan of giving a dictation lesson on slate has been already described. When the scholar has reached Standard IV., less time may be given to copy-book writing, and more to dictation on paper. But if the writing in copy-books be too much neglected, it quickly becomes small, uneven, and slovenly; and if there is too little practice of dictation on paper, the children are at a loss to arrange what they have to write, and write too slowly. Dictation on *slate* should never be given to the higher standards, except when the desks are not at liberty, and a fair pace in writing should be insisted on. See that the capital letters are well made, and the words not crowded into each other.

(*d*) **Arithmetic on Paper.**—The practice already given in setting down sums on slate, and the aid given by Cox's Copy-Books, Nos. 6 and 8, in the Arithmetic of Standards II. and III., are excellent helps in training the children to work their arithmetic on paper. Occasional lessons are also given to Standards III. and IV. by placing the sums on the blackboard, line by line, and then the class copying them on foolscap, the teacher taking care that the sums are placed in *the middle of the paper;* the general tendency is to place them too near the margin on the left-hand side

of the paper. We also give directions for the dots separating the figures to be small and placed *on* the line, that the figures be not crowded together, and that they be placed exactly under each other. The ruling is then carefully superintended, and a caution given not to make the lines too heavy.

During the last nine months of the school year we give Standards III. to VI. sums in arithmetic to work *on paper* as part of the *Home Lesson* each night, after previously explaining the work in school, and they are required to set them down as carefully as if for the annual examination. Thus an abundance of *practice on paper* is given during the year.

(*e*) **Drawing.**—The teaching of Drawing materially improves the writing, especially the capital letters. It trains both the hand and the eye. As soon as the scholar has reached the Third Standard, he should commence drawing, first on slate, then on paper.

In conclusion, I would remark how essential it is that the teacher himself and all his pupil teachers should be good writers not only on paper but on the blackboard, and what a bad influence *scribbling on the blackboard* must necessarily have on the writing of the whole school. As the teacher writes, so will his scholars. *The teacher himself should first endeavour to realize what constitutes excellence, and then try to raise his pupil teachers to the same standard.*

If each teacher were to pay particular attention to the writing of his pupil teachers on the blackboard during the first year of apprenticeship, he would be amply rewarded by the superior finish which they would bestow on the writing of the whole school.

This completes the outline of the system which we employ in the teaching of writing. Some may perhaps ask, 'Why go into all these details?' To these I would reply, 'If excellence in writing is desired, *minute details must be attended to.*' Good plans and plodding hard work are equally essential. Let each teacher cherish within him a perpetual striving after excellence.

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How I teach Geography.

BY A. PARK, F.R.G.S., F.E.I.S., ETC.,

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TO the natives of the British Islands, whose mercantile marine are the recognised *carriers* on the ocean, whose *white sails* dot the seas surrounding almost every land, and upon whose colonial and foreign possessions the sun never sets, geography —historical, commercial, and political—ought to be invested with the very deepest interest.

As a nation, our agricultural productions are of secondary importance; our dependence for our national prosperity and well-being being mainly upon our vast manufacturing industries.

Seeing also that our production in this direction is immensely in excess of our home demands, we are, of necessity, constantly on the outlook for remunerative markets in other parts of the world, for the interchange of our manufactured commodities, so that an acquaintance with geography in respect to the situation and physical peculiarities of other lands, —the habits, customs, and special necessities of their inhabitants,—becomes of vital importance to us.

Not only, however, from this utilitarian point of view might instruction in geography in the primary as well as in the secondary schools of this country be insisted upon, but its importance as 'an interpretation of nature and art' in the intellectual training of the young could very easily be demonstrated. Undoubtedly the subject has long been taught as part of the ordinary curriculum in the great majority of the better class schools of the country, and in a large proportion of our elementary schools, for about a quarter of a century, but, we must candidly confess, with very indifferent success.

The causes of this may be very well set forth in the following comments made upon the subject by gentlemen who have had the most favourable opportunities for forming opinions on the matter:—'The teaching of geography is too mechanical; the memory is overburdened and the intelligence and imagination stunted by way of exercise and illustration.'

'Many teachers make the weary scholars learn by heart tedious strings of mere names and numbers, and are content with mechanical instruction and stereotyped sets of words; who work as if they and their scholars were machines and not reasonable beings.'

'Mere cram of a little text-book is, in too many cases, the sole preparation for the examination in geography.'

One gentleman of very wide experience, and of close observation, has lately remarked that in many schools which he has visited, 'the children have no more idea of a map than they have of the meaning of an Egyptian papyrus or an Assyrian cylinder.'

Whether this be an exaggeration or not, there is a general consensus of opinion on the part of Her Majesty's Inspectors of Schools, and the Examiners in connection with the Oxford and Cambridge Local Examinations, that the subject of geography seems to be very badly, because uninterestingly and unintelligently, taught.

No little discussion has taken place lately, especially among elementary teachers, respecting the wisdom and justice of the Education Department in insisting on what are technically known as the 'Class Subjects' (of which geography is the one most commonly selected) being taught through 'Reading Lessons.'

Into the merits of the question it does not fall within the scope and purpose of this article to enter.

We fear, however, and not without justice, that the representations made to the Department by those officers whose duty it is to report on the state of the elementary education in the country, have clearly demonstrated that some change in the way in which geography and the Class Subjects have been taught has become a matter of absolute necessity.

The very books, these gentlemen urge, which have been employed for instruction in geography, and the manner in which they have been utilized by the teacher, demand reform.

Cheap little penny and twopenny pamphlets are in general use in such schools; the lists of words, names, and definitions are learnt by heart, and said by rote, without any exercise of what Professor Bain describes as 'the conceiving power, grounded on distinct lines of observation and experience.'

These little works are, in the incisive language of

the *Saturday Review*, described as 'the tinned meat of the intellectual life' usurping the place of the fresh, vigorous, and graphic preparations.

'Geography,' says Mr. Moseley in his Report to the Privy Council on Education in 1845, 'acquires its full value as a branch of education only when it loses the character of an accumulation of facts, undigested by the child's mind, but heaped up in his memory, linked by no association with the world of thought and of action which immediately surrounds it, or with that which is within it.

'Tell the child to observe the lines of the map which hangs perpetually before his eyes, and talk to him only of the *names* of the places indicated upon it, and you will soon weary his attention; but speak to him of the men who inhabit any of these places, tell him of their stature, and aspect, and dress, and ways of life, and of their forms of worship,—speak of the climate of that country, of the forms of vegetable and animal life with which his eye would be conversant if he dwelt there, of the trees and flowers that grow there, and of the birds and beasts,—and you will carry his interest with you.'

We have said this much by way of introduction, because it very fairly represents the views we entertain on the subject, and the general principles by which we have been guided in imparting instruction in geography, with, what we believe, fair success, for upwards of twenty years.

FIRST LESSONS.

Notwithstanding the opinion of Professor Bain, who considers Object Lessons hardly adequate as a means of introducing the elements of geography to children of eight or nine years of age, our experience goes to show that *informal* lessons on 'sunshine and rain, heat and cold, snow and ice, for conceiving where the hottest days at home are the constant fact; and, again, in other portions of the earth, where ice and snow endure three parts of the year,' are very valuable helps as early introductory lessons on the subject.

Our habit has been—so soon as the children come to us from the infant room, where they have been well exercised in form and colour, and have been taught 'to point out the appearance or sensible qualities of an object, and to specify its uses'—to introduce the pupils to the field of natural history, and to cultivate their observing powers.

The suggestions made by Mr. Moseley in the Report to which we have already referred, we have found of great value at this stage. He advocates that the child should be made acquainted 'with the characteristic features of that portion of the earth's surface which is within the compass of a day's journey, its varieties of elevation and aspect, its hills, valleys, and streams; and his attention directed to the agrarian divisions of his parish, and the fields and holdings which unite to form it. The boundaries of these, with which his memory is familiar, will convey to him the first idea of a map and its uses.' All this is not the work of a day, or even of a week, but must be carefully and judiciously *dealt* out piece by piece to the young people.

It is in these early stages that the *experienced* teacher is of great value; and to leave this part of the work for its logical and successful treatment to the junior assistant or the pupil teacher, is morally certain to lead to failure. This is what is known as the '*Synthetical System*,' as opposed to the '*Analytical*,' which sets out with general views of the entire surface of the earth, and gradually descends to one's own neighbourhood.

Into the comparative merits of the two systems we do not at present enter, but the reader will find the subject very fairly and very interestingly discussed by Mr. Robinson, of the Irish Inspectorate, in his excellent treatise on *Method and Organization*.

It matters little which system is adopted. One thing seems tolerably clear to our mind: we are bound to employ to a greater or less extent what may be called the *topographical* system at the very threshold of the subject. That is to say, as Mr. Robinson puts it, 'the terms *city*, *country*, *continent*, *river*, *mountain*, etc., do not in general convey correct ideas of the things themselves to the minds of the children; and hence we must appeal to topography first, not as a system of teaching, but only as a means of explanation of certain terms.' Professor Bain would call this 'concrete realization,' and would be disposed to doubt the possibility of many parts of England—for example, the eastern counties, flat and monotonous—affording material for geographical conceptions. This is undoubtedly true, but we have now the most valuable helps to the teaching of geography, such as *models*, *sketches*, *pictorial views*, etc.; but better still, we have the way open to us of constructing clay models, etc., before the very eyes of the children.

HOW CAN CLAY MODELS BE UTILIZED FOR INSTRUCTION IN GEOGRAPHY?

The method we recommend is to have a table placed before a class—a junior class, of course—on which a quantity of soft clay and sand is placed. If, for example, it were desired to give the children an idea of a volcano, nothing would be easier than for the teacher to construct a model of one from the clay, and, while proceeding with this, explaining step by step at the same time, and in simple language, the gradual growth of the volcano from its early beginnings until it reached its giant proportions—why it has a *conical* shape—why a *cup-like* depression at its summit—the nature and character of the rocks on its sides, encouraging, at the same time, the children to put any kind of question to the teacher which their naturally playful and inquisitive imagination might suggest. The rough model of the volcano having been constructed before the eyes of the children in the way I have indicated, the employment of some simple piece of *fireworks* might well illustrate the *eruptions* which give the distinctive name to this kind of mountain.

With clay, also, the *hills*, *valleys*, *plains*, etc., could be appreciably illustrated even to the very youngest children.

To teach geography in the *early stages* simply by *definition* without familiar and appropriate illustration is, as Herbert Spencer properly remarks, 'wholly at variance with the method of nature, as exhibited alike in infancy and in the course of civilisation.'

Excellent sheets of *familiar illustrations* are also published by Messrs. Keith Johnston of Edinburgh; Reynolds; and Murby of London, and other firms

throughout the country, which are very useful at this stage.

Lately, however, cheap *raised maps*, illustrating capes, mountains, rivers, and the physical surface of various countries, have found their way into England from Germany, where geography has been taught for many years with singular ability and success.

To depend upon mere *verbal definition*, is 'not to teach the child how to observe, but to make it the mere recipient of another's observation—a proceeding which weakens rather than strengthens its powers of self-instruction, which deprives it of the pleasures resulting from successful activity, and is certain to generate indifference and even disgust towards' the subject of geography.

Formal and *verbal* definition must of necessity be given, and insisted upon being committed to memory, but these definitions must be wholly dependent upon the intelligent appreciation of that which is defined.

ASTRONOMICAL GEOGRAPHY.

To what extent should it be taught to young children? We have raised this question in order to direct attention in a sentence or two to the 'Standard of Examination' prescribed by the Education Department in the 'Code' for pupils of the Second Standard, or in other words, for children whose average age is between eight and nine.

The Syllabus runs thus:—'*Definitions, points of compass, form and motions of earth, the meaning of a map.*' Experienced teachers and the foremost educationists in the country are now pretty well agreed that the course of study laid down here is, in some aspects of it, quite beyond the grasp of children of the age for whom it is prescribed.

The 'points of the compass' and the 'form and motions of earth' cannot be taught with any reasonable measure of intelligent apprehension to young people until their minds are more expanded by age and discipline.

These two subjects of the Syllabus might be *thrown in* at a higher stage, and some additional portion of *descriptive* geography might very well take their place. If, however, the earth considered as a *planet* must be brought under the consideration of young people of this age, such *artificial* aids as the *tellurium*, the *orrery*, and other mechanical appliances which can now be obtained very readily from several London publishers, must be called most liberally into requisition.

Even with all the aid which can be obtained from the very best of these, the results, so far as an intelligent grasp of the matter is concerned, are far from being satisfactory.

We have found the use of a 'magic lantern,' in which *slides* exhibiting the causes of day and night, the rotundity of the earth, etc., are employed, to be of very great service at this stage, and an occasional evening meeting with the children in this way during the winter has been productive of much good to parents and children alike.

A RIVER AND RIVER SYSTEMS.

The manner in which we would treat this part of the Syllabus for junior children will pretty fairly represent the particular *method* which we would advise should be followed with other parts of the subject of equal importance.

We have in our own personal teaching very closely followed the lines laid down by Professor Bain in his work on *Education as a Science*, who remarks: 'The main lesson in the geography scheme is to conceive the visible aspect of the flowing waters, in the main stream and in all its branches, from the first rills emerging out of the oozy hill-tops and hill-sides.' We have likewise endeavoured—a course also approved by Professor Bain—to bring before the children's minds a 'visible picture of a river tree, as if from a bird's-eye view of its entire basin,' sketching out its tributaries, rivulets, brooks, and cascades,—not omitting, of course, the hills and valleys, and their relations to the stream, the 'connection of rivers with towns,' and the manner in which they minister to the comfort and healthfulness of the people.

By employing question and answer, and frequent repetition, we have here materials on the 'river and the river basin' sufficient for many lessons to the undoubted development of the intelligence and increased interest of the children.

Familiar and homely illustrations can always be used with advantage at this stage.

Mr. Steele, one of Her Majesty's Inspectors of Schools, appropriately observes in a Report to the Privy Council on Education: 'I have seen Preston boys receive quite a new sensation on being told that when they walked up the river and saw the Darwen run into the Ribble, they had before them what the geography books described in mystic terms as a tributary and a confluence.' Still further, to relieve the monotony of dryness and mere 'verbal memory,' Professor Bain suggests that poetry might now and then be brought to the aid of the 'geographical concrete,' and Tennyson's *Brook*, for example, might be read aloud to a class, as exhibiting in a fascinating form 'one of the numerous affluents of a mighty river.'

We think we have sufficiently indicated the manner in which we are in the habit of introducing our younger children to the study of geography.

It may be thought, perhaps, that we have dwelt at too great a length upon this part of our subject, but our experience has shown that everything depends upon intelligent principles in the earlier stages of instruction if real success is to be expected and attained.

GENERAL OR DESCRIPTIVE GEOGRAPHY.

When our pupils enter upon the study of a country, our practice has been to prescribe a certain amount of task-work to be learned at home from a text-book, and to insist upon its being well prepared.

'At all stages of geography,' says Professor Bain, 'local situation, form, magnitude, should be a distinct effort of memory, and should be held in the mind as visible facts, grounded on the map or model.'

Impressed with the truth of this, we first of all exercise the children in their various classes and in their various stages upon the portion of the lesson prescribed for each day's work with the map before them.

After the children have been made in this way *perfectly* familiar with the position, boundaries, magni-

tude, the general features of a country,—*i.e.* the rivers, valleys, mountain-ranges, plains, coast-line, etc.,—the situation of the towns, an account of the inhabitants, of the vegetable, animal, and mineral productions, and the industries of the country follow in natural sequence.

Skeleton Maps.—Each class ought to be provided with a skeleton map, and when the children have been well *drilled* upon the physical features of a country from an ordinary wall map, the skeleton one ought regularly to be used in testing their knowledge. In other words, the *ordinary* map is employed for *teaching* geography, the *skeleton* map for *examining* upon it.

The Blackboard and Geography Lesson.—We fear the blackboard is not so frequently employed in giving instruction in geography as it ought to be. Even in the early stages it could be used with much advantage.

(1) Our plan is to place the map and the blackboard alongside each other, and, bit by bit, to fill in the outlines of a country, employing question and answer as we proceed.

(2) To trace the courses of the rivers and the ranges of mountains in the same way.

(3) To require the children to *dot* in the situation of the chief towns, learning at the same time the countries, or counties, to which they belong.

(4) In more advanced stages the pupils should be required, under similar conditions of knowledge, to sketch the outlines, trace the courses of the rivers, etc, of any country with a piece of chalk on the blackboard, each scholar being required to complete a small portion without any aid from the map.

This plan of examination is certain to secure the attention of the class, and by this method of repetition and reproduction the information conveyed is more firmly fixed in their minds.

Suggestions as to teaching Geographical Names.—In all instruction in geography, it is absolutely necessary that the names of places, etc., should be taught; but as Mr. Robinson, to whom we have previously referred, observes, 'instead of teaching the names by themselves, they shall be joined with everything which will create in the minds of the children an interest and a pleasure, so that, thus associated, they may be permanently remembered.'

This remark very fitly expresses the lines on which we have proceeded, especially with our pupils who had entered on the study of *descriptive* geography, and we can testify to the great pleasure and interest which have been produced by the practice even among comparatively young children. It was first suggested to us in one of the very earliest issues of the *Minutes of Council*,[1] in which the whole subject was discussed with more than ordinary ability, and we are therefore tempted to give an extract from the same:—'The *names* may be made interesting by an attention to their derivation. In fact, "the *Etymology* of geographical names forms an important feature in this branch of knowledge. The name of a place often tells its condition or history; and the explanation of the same, by calling into exercise the power of association, increases the probability of its being remembered. Thus the name *Buenos Ayres* still shows the salubrity of the *air* of that town; *Sierra*, the Spanish name for a range of hills, the *saw*-like appearance which it presents; New *York* tells us that it was once a colony of *England*, and those who know that it was first called New *Amsterdam* know, too, that it was founded by the *Dutch*; *Virginia* shows that it was colonised in the reign of our *virgin* queen, Elizabeth; *Carolina*, during that of Charles (*Carolus*). The term *fell*, applied to mountains in the north of England, the south of Scotland, and to the islands of the north and west, shows that these parts of the country were occupied by some tribe or tribes of Scandinavian origin; while *ben*, or *pen*, found in the most mountainous regions, confirms the facts of history, that these high grounds were unconquered by the northern invaders, and continued in possession of the original Celtic inhabitants. In thus finding out the cause of the name, the reason has been exercised, and the study rendered highly philosophical; and a science which has often been thought to consist only of lists of hard unmeaning words, has been made attractive in a more than usual degree."'—The subject could be pursued to a very great length, and we recommend Isaac Taylor's work on *Words and Places* as affording great assistance to the teacher in the preparation of his work for class instruction in geography.

It may not be out of place here to observe that great care should be exercised by the teacher to consult the very best dictionaries dealing with the question of the pronunciation of *geographical* names.

[1] *Minutes of Council*, 1846-47, vol. ii. p. 356.

CONCLUDING SUGGESTIONS RESPECTING CLASS INSTRUCTION IN GEOGRAPHY.

These may best be given in the form of hints which our *experience* suggests.

(1) *The teacher ought to know the subject on which he is giving instruction well, and teach without the use of a text-book in his hand.* No possible excuse can be allowed for any teacher who does not attempt to arouse the attention and excite the interest of his scholars while conducting a lesson on geography. Books of travel—most pleasantly and agreeably written—and lively narratives of tourists are to be found in every library, and on every bookstall; and if the teacher were only to make a liberal use of the information he could cull from these, greater freshness and life would be imparted to his teaching. 'The description of a country like Switzerland, for instance, its mountains, lakes, plains, glaciers, waterfalls, avalanches, smiling valleys, and eternal snows, all accompanied by a proper map, and a description of the habits and governments of the people, would certainly do far more to instruct the mind than a catalogue of boundaries and divisions, involving a number of names to which no mental imagery whatever is attached.'

(2) *From an outline or skeleton map of a country, try to deduce the situation of the principal cities and towns, etc.* This is one of the best tests which can be applied with respect to the *manner* in which our instruction in geography has been imparted.

Nothing could better ascertain whether the intelli-

gence has been quickened and the reasoning powers cultivated.

Mr. Robinson, with much tact and judgment, puts the case thus :—'Certain conditions are given, from which certain consequences are to be inferred. Thus they are expected to discover that the rivers of Eastern Europe are slow, and of Western Europe rapid ; after having been told that the former have their rise at a slight elevation, and have a lengthened course ; and the latter originate in the high land of Central Europe, at no great distance from the sea. Political and social geography are thus shown to be in a great degree dependent on physical geography : the reason is seen why one country is agricultural and another commercial ; why a certain manufacture should be carried on in a particular locality in preference to every other; and why an alteration in the mode of manufacture should involve a change in its seat. Thus, that Holland is agricultural, and England manufacturing ; that our cotton manufacture is carried on in South Lancashire and the edges of the neighbouring counties, and not in Lincolnshire; that our manufactures generally are travelling north and west; and that iron, which was once largely manufactured in Kent and Sussex, is now only smelted on the great coalfields, are not merely so many facts, but highly interesting facts, because regarded as effects the causes of which are perceived, and have probably been discovered by the student himself.'

(3) *Encourage the scholar to draw maps of different countries with care and taste.* Professor Bain remarks that 'the drawing of maps impresses a country, just as copying a passage in a book impresses the author's language and meaning. In those cases where drawing is followed out as a fascination, it carries with it an interest in the face of nature, and an enhanced power of conceiving the pictorial aspects of the world.'

(4) *Train the scholars, especially in the senior classes, to write out in the form of an Essay descriptive accounts of a country, such as its river systems, mountains, productions, etc.* This is a very valuable exercise not merely in obtaining a fair idea of the knowledge which the scholar may have of the subject, but it is likewise a valuable exercise in acquiring the power of composition.

Lastly, *see that the teacher's own mind is full of the subject, and let him endeavour to acquire the use of pleasing and attractive language in class instruction.* To teach geography well, and with the success which ought to attend it, the teacher ought to remember that it requires a great deal of general knowledge, and this can easily be obtained by careful reading.

'A real knowledge of geography,' says Dr. Arnold, 'embraces at once a knowledge of the earth and of the dwellings of man upon it. It stretches out one hand to history, the other to geology and physiology. It is just that part of the dominion of knowledge where the student of physical and of moral science meet together.'

Recent Inspection Questions in Geography.

STANDARD III.

(1) Name a seaport in South England.
(2) Name the rivers of Pembrokeshire.
(3) What county touches Pembrokeshire?
(4) Name the chief openings connected with the North Sea.
(5) What strait is connected with the English Channel?
(6) What large county touches the North Sea?
(7) Name a seaport in Lancashire.
(8) Name a seaport in South Wales.

STANDARD IV.

(1) Where is India?
(2) What is a peninsula?
(3) Name the chief towns in India.
(4) Name a large island near India.
(5) Name one of the divisions of India.
(6) Where is Madras?—Bombay?
(7) Where are the Himalayas?
(8) Name the chief peaks in the Himalayas.
(9) What is the highest mountain in Great Britain?
(10) What is the largest lake in the British Isles?
(11) What is the largest town in Scotland?
(12) On what does it stand?
(13) What counties touch the North Sea?—English Channel?
(14) Name the chief openings on the west coast of Ireland?

STANDARD V.

(1) Give the boundaries of Europe.
(2) How many continents are there besides Europe?
(3) What is the most important country in Europe?
(5) Why is Great Britain the most important, for it has not the greatest number of soldiers?
(6) What countries or empires have the greatest number of soldiers?
(7) What is the Emperor of Russia called?
(8) Where does he live?
(9) What is the King of Turkey called?
(10) Where does he live?
(11) What is the Sultan's wife called?
(12) In going from Athens to the Black Sea, what sea do you pass?
(13) What is an archipelago?
(14) Name the largest island in the Archipelago.
(15) Name some other islands on the east of Greece.
(16) What are those islands on the east of Greece called?
(17) What countries of Europe have been at war recently?
(18) Where is the Gulf of Ægina?
(19) Name some towns in Greece besides Athens.
(20) What is there at Corinth besides a town?
(21) What river of importance runs through Russia into the Caspian?
(22) What town stands at the mouth of the Volga?
(23) Name some other towns in Russia.
(24) Where is Archangel?

Pupil Teacher's Examination Questions.

JANUARY 1881.

CANDIDATES.

Three hours and a half allowed.

Arithmetic.

MALES.

1. Find the value of 694 cwt. 1 qr. 14½ lbs. at £3, 19s. 4d. per cwt.

2. If the tax on £335, 7s. 6d. amounts to £58, 13s. 9¾d., what is that in the pound?

3. A besieged town containing 22,400 inhabitants has provisions to last for three weeks; how many must be sent away in order that the city may hold out for seven weeks?

4. A ceremony attended by a number of persons from a distance extends over 2 days. The first day the railway conveys 285 first-class and 3085 third-class passengers, charging 2s. 8d. for each of the former, and 1s. 7½d. for each of the latter. The second day, in hopes of larger receipts, the railway issues tickets at the uniform price of 1s., and conveys 6009 passengers. Find the difference in the sums taken on the first and on the second day.

FEMALES.

1. Find, by practice, the value of eighty dozen pairs of boots at 19s. 7½d. per pair.

2. Find the value of 1527 cwt. 2 qrs. 16 lbs. of sugar at 3½ guineas a cwt.

3. Make out a bill for the following:—

62½ tons of hay at £3, 15s. per ton.
41¼ qrs. of beans at £2, 2s. per qr.
58¾ qrs. of oats at £1, 6s. per qr.
25 sacks of flour at £1, 7s. 6d. per sack.
37½ tons of potatoes at £4, 2s. 6d. per ton.

4. Find the rent for 61 months 1 week 4 days at £3, 0s. 6d. per month of 4 weeks.

Grammar.

1. Parse all the verbs and adjectives in the following:—

'It is sad to see an infant fade
Beneath our very gaze,
As a lily in some poisonous shade,
Droops, withers, and decays;
It is sad to see the eye's pure light
Grow fainter day by day.'

2. Plurals are sometimes formed from the singular by a change in the body of the word. Give examples of this.

3. Adjectives of number are sometimes used as adjectives, sometimes as nouns. Give examples of each.

Geography.

1. Mention the different names given to openings in the land, and to narrow passages of water on the coasts of Great Britain and Ireland; and give examples of the use of each term, describing exactly where each of them is.

2. Trace minutely the line of *water-parting* which separates the basins of the Thames and Severn from those of rivers flowing into the English Channel, and mention these rivers in order.

3. Say what you know about the Orkneys and Shetlands, the Hebrides, the Isle of Man, Anglesey, the Isle of Wight, and the Channel Islands.

Draw a map, *if you can*, in illustration of any one of your answers.

Composition.

Write from dictation the passage given out by the Inspector.

Penmanship.

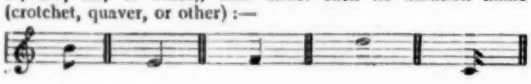
Write, in large hand, as a specimen of copy-setting, the word *Versatility*.

Write, in small hand, as a specimen of copy-setting, '*Stirred up by Dorset, Buckingham, and Morton, he comes.*'

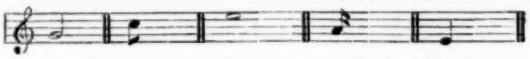
Music.

A quarter of an hour allowed for this paper.

1. Write over each of the following notes its pitch name (C, D, *Do*, *Re*, or other), and under each its duration name (crotchet, quaver, or other):—



2. Follow each of these notes by its corresponding rest:—



3. How many tones and semitones are found in a major scale, and what are the places of the latter?

ANSWERS.—CANDIDATES.

Arithmetic.

MALES.

1.

	£	s.	d.	
	3	19	4	
		694		
	2752	17	4	= value of 694 cwts.
1 qr. = ¼ of 1 cwt.		19	10	= ,, 1 qr.
14 lbs. = ½ of 1 qr.		9	11	= ,, 14 lbs.
½ lb. = 1/28 of 14 lbs.			4½	= ,, ½ lb.
£	2754	7	5½	= value of 694 cwt., etc.

2. £345, 17s. 6d. : £1 :: £58, 13s. 9¾d. : 3s. 6d. Ans.
Or, tax on £335, 17s. 6d. = £58, 13s. 9¾d.
,, £1 = £58, 13s. 9¾d. ÷ £335½
= 56343d. / 335½d. = 3s. 6d. Ans.

3. 7 weeks : 3 weeks :: 22400 inhabitants.
(22400 × 3) / 7 = 9600 ,,
Therefore 12800 must be sent away.

4.

	£	s.	d.	
285 at 2s. 8d. =	38	0	0	
3085 at 1s. 7½d. =	250	13	1½	
	288	13	1½	total for 1st day.
6009 at 1s. =	300	9	0	,, 2d ,,
£	11	15	10½	= difference of receipts.

FEMALES.

1. 80 dozen pairs = 960 pairs.
960 pairs at 19s. 7½d. = (960 at £1 less 960 at 4½d.).

960 at 4½d. each.

4d. = 1/60 of £	16			= value of 960 at 4d.
½d. = ⅛ of 4d.	2			= ,, ,, ½d.
£	18			= value of 960 at 4½d.

Therefore 960 at 19s. 7½d. = £960 − 18 = £942.

2.

	£	s.	d.	
	3	13	6	= value of 1 cwt.
	1527			
	5611	14	6	= value of 1527 cwt.
2 qrs. = ½ cwt.	1	16	9	= ,, 2 qrs.
14 lbs. = ¼ of 2 qrs.		9	2½	= ,, 14 lbs.
2 lbs. = 1/7 of 14 lbs.		1	3⅔	= ,, 2 lbs.
£	5614	1	9	= value of 1527 cwt., etc.

3.

	£	s.	d.
62½ tons at £3, 15s. per ton =	234	7	6
41¼ qrs. at £2, 2s. per qr. =	86	12	6
58¾ qrs. at £1, 6s. per qr. =	76	7	6
25 sacks at £1, 7s. 6d. per sack =	34	7	6
37½ tons at £4, 2s. 6d. per ton =	153	13	1½
Total, £	585	8	1½

4.

	£	s.	d.	
	3	0	6	rent for 1 month.
	61			
	184	10	6	rent for 61 months.
1 week = ¼ of 1 month		15	1½	,, 1 weeks.
4 days = 1/7 ,,		8	7 2/7	,, 4 days.
£	185	14	3 2/7	rent for 61 months, etc.

Grammar.

1. *Is*—3d pers. sing. pres. indic. of the incomplete irreg. verb *am, was, been*, agr. with its subj. *it*.
sad—a common adj. qual. *it*.
to see—pres. infin. irreg. trans. verb *see, saw, seen*.
fade—pres. infin. reg. intrans. verb *to fade* (*to* omitted after verb *see*).
our—poss. adj. (pronominal) qual. *gaze*.
very—adj. qual. *gaze*.
some—indef. numeral adj. qual. *shade*.
poisonous—common adj. qual. *shade*.
droops—3d pers. sing. pres. indic. of reg. intrans. verb *to droop*, agr. with subj. *lily*.
withers—3d pers. sing. pres. indic. reg. intrans. verb *to wither*, agr. with subj. *lily*.
decays—3d pers. sing. pres. indic. reg. intrans. verb *to decay*, agr. with subj. *lily*.
is—3d pers. sing. pres. indic. of incomplete irreg. verb *am, was, been*, agr. with subj. *it*.
sad—common adj. qual. *it*.
to see—pres. infin. irreg. trans. verb *see, saw, seen*.
pure—common adj. qual. *light*.
grow—pres. infin. irreg. intrans. verb *grow, grew, grown*.
fainter—adj. with somewhat of an adverbial force, qual. *light*.

2. The following nouns form their plurals by a change in the body of the word, viz. :—

Sing.	*Plu.*	*Sing.*	*Plu.*
Man	Men.	Tooth	Teeth.
Foot	Feet.	Louse	Lice.
Goose	Geese.	Mouse	Mice.

3. Adjectives of number are sometimes used as nouns; for example :—

Adjectives.	*Nouns.*
One boy.	This is the *one*.
Fifty men.	Count by *fifties*.
Two or three girls.	How many *twos* in six.

Geography.

1. The different names given to openings in the land on the coasts of Great Britain and Ireland are :—
Frith—as Frith of Clyde, separating Ayr and Renfrew from Bute, Argyle, and Dumbarton.
Mouth—as Mouth of the Thames, between Essex and Kent.
Bay—Cardigan Bay, west of Cardigan and Merioneth.
Loch—Loch Ryan, north-west of Wigtownshire.
Lough—Lough Swilly, north of Donegal.
Harbour—Waterford Harbour, between Wexford and Waterford.
Haven—as Milford Haven, west of Pembroke.
River—in the case of Kenmare river, west of Kerry.
Names given to narrow passages of water :—
Channel—as North Channel, between Scotland and Ireland.
Strait—Straits of Dover, between Kent and France.
Sound—Sound of Mull, between Mull and Argyle.
Kyle—Kyles of Bute, between Bute and Argyle.
Peculiar are—(1) The *Narrows* of Skye. (2) The *Pentland Frith*.

2. The line of *water-parting*, separating the basins of the Thames and Severn from those of rivers flowing into the English Channel, begins in the east of Kent, and continues in a very irregular course along the Wealden Heights, the Downs of Hampshire, Salisbury Plain, Exmoor, Dartmoor, and the Cornish Highlands. The rivers flowing into the English Channel are :—the Ouse, the Arun, the Itchen, the Test, the Avon, the Frome, the Exe, and the Tamar; all which flow southward.

3. The *Orkney* and *Shetland Islands* form together one county, north of the mainland of Scotland. Chief town of the Orkneys is Kirkwall, in Pomona or Mainland; and the chief town of Shetland is Lerwick, in an island also known as Mainland. The Orkneys are mostly low and fertile; the Shetlands, mostly mere stacks of rocks, give name to a breed of ponies called Shelties.

The *Hebrides* form two groups of islands lying along the west of Scotland. The *Inner Hebrides* lie close to the coast, and consist of these principal islands: *Skye, Mull, Jura, Islay, Colonsay*, and *Oronsay*. The Outer Hebrides form a long chain, and are parted from the Inner by the Minch and Little Minch, the chief being *Lewis, Harris, N. Uist, Benbecula, S. Uist*, and *Barra*.

The *Isle of Man* lies in the middle of the Irish Sea. Chief towns are *Douglas* and *Ramsey*. The island retains its own government and judges. Its people are called Manx.

The *Island of Anglesea* forms a distinct county, separated from the mainland by the Menai Straits. Its chief town is Beaumaris. Holyhead, on Holy Island, is the point of departure of travellers from England to Ireland.

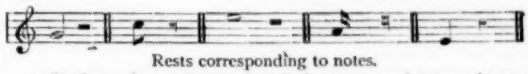
The *Isle of Wight*, south of Hampshire, famous for its beauty and the mildness of its climate, is separated from the mainland by the channels of Spithead and the Solent. Its chief towns are *Newport, Cowes, Ryde*, and *Ventnor*.

The *Channel Islands*, off the coast of Normandy in France, have belonged to England since the time of William the Conqueror. They consist of *Jersey, Guernsey, Alderney*, and *Sark* or *Sarcq*, and a few others. Chief town in Jersey, St. Helier; in Guernsey, St. Peter's Port. Alderney is noted for its breed of cattle.

Music.

1.

2.



Rests corresponding to notes.

3. In the major scale are found *five tones and two semitones*, —the latter being found between the third and fourth, and seventh and eighth notes.

FIRST YEAR.

Pupil Teachers at end of First Year.

Three hours and a half allowed.

Arithmetic.

MALES.

1. Reduce 18 furl. 3 poles $3\frac{1}{2}$ yds. to the decimal of 1 mile; *and* 4 ft. 6 in. to the decimal of 3 yds. 2 ft.

2. If 1191 tons 10 cwt. 1 qr. 14 lbs. cost £595, 15s. $2\frac{1}{4}$d., what is the cost of half a million tons? Work this sum by fractions.

3. A farmer has 295 more sheep than cows, and this difference is $\frac{2}{3}\frac{3}{5}$ of the number of sheep he possesses; how many cows has he?

4. In exchange for 1 cwt. of coffee at 1s. 6d. per lb., how much money would you expect to receive along with 18 lbs. of tea at ·428571 of a guinea per lb.?

5. Find the greatest common measure of 805 and 1311; *and* the least common multiple of 15863 and 21489.

FEMALES.

1. How many yards of lace can I buy for £685, 17s. 9d. at the rate of five guineas for $12\frac{3}{4}$ yds.?

2. If after paying income-tax at 1s. 2d. in the pound, a gentleman has £701, 10s. 10d. remaining, what is his annual income?

3. If £69, 0s. $11\frac{1}{2}$d. pays the carriage of 47 tons 8 cwt. 33 lbs. of goods for 764 miles, what weight should be carried 573 miles for the same sum?

4. If 72 oxen require 18 acres of turnips to supply them for 30 weeks, how many acres would supply 18 score of sheep for 45 weeks, on the supposition that 9 oxen eat as much as 30 sheep?

Grammar.

1. What are the two kinds of participles? Describe them, and give examples of each.

2. Parse the pronouns in the following :—
'Which pillage they with merry march bring home
To the tent royal of their emperor.'

3. The words *each* and *other* are used both as adjectives and as pronouns; give examples of them in both uses.

4. Give notes of a simple lesson on *adverbs*, suited to Standard IV.

Geography.

Answer *either* Q. 1 *or* Q. 3, *not both*.

1. Trace minutely the line of *water-parting* which separates the basins of the Thames and Severn from those of rivers flowing into the English Channel, and describe those rivers in order.

2. Draw a full map of the coast from Cape Spartivento to Cape Matapan.

3. Describe, as fully as you can, the physical features, chief divisions, towns, and manufactures of the Austrian Empire. What title does the sovereign bear at Vienna, and what at Buda-Pesth? Why are they different?

History.

1. Give the dates of Henry I., Richard II., Richard III., and Elizabeth, and name their immediate successors.

2. Write out a list of our sovereigns from Charles I. to Anne, with dates.

3. Why is this called the nineteenth century? When did it begin, and when will it end?

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Versatility.*

Write, in small hand, as a specimen of copy-setting, '*Stirred up by Dorset, Buckingham, and Morton, he comes.*'

Composition.

Write from memory the substance of the passage read to you by the Inspector.

Music.

A quarter of an hour allowed for this paper.

1. Write in (*a*) the scale of D (*Re*), and in (*b*) the scale of B♭ (*Se*), placing a sharp or a flat before each note requiring one. Mark the places of the semitones.

2. Place its third over (*a*), its fifth over (*b*), its fourth over (*c*), its second over (*d*), and its seventh over (*e*).

3. How many quavers are equal (in length) to one semibreve?
" quavers " " one minim?
" quavers " " one crotchet?

ANSWERS.—FIRST YEAR.

Arithmetic.

MALES.

1. (*a*) $\frac{18 \text{ fur. } 3 \text{ po. } 3\frac{1}{2} \text{ yds.}}{1 \text{ mile}} = \frac{3980}{1760} \text{ yds.}$
$= \frac{199}{88}$
$= 2{\cdot}26136$. Ans.

(*b*) $\frac{4 \text{ ft. } 6 \text{ in.}}{3 \text{ yds. } 2 \text{ ft.}} = \frac{54}{132} \text{ in.}$
$= \frac{9}{22}$
$= {\cdot}409$ Ans.

2. 1191 tons 10 cwt. 1 qr. 14 lbs. $= 1191\frac{83}{160}$ tons $= \frac{190643}{160}$,

£595, 15s. $2\frac{1}{4}$d. $= 595\frac{243}{320} = £\frac{190643}{320}$.

Now, stating terms in fractional form,

$\frac{190643}{160}$ tons : $\frac{500000}{1}$ tons :: $£\frac{190643}{320}$
$= \frac{160 \times 500000 \times 190643}{190643 \times 320 \text{ 2}} = £250000$. Ans.

3. 295 sheep $= \frac{59}{65}$ of whole number;

therefore $\frac{295 \times 65}{59} = 325$ sheep = whole number,

and thus $325 - 295 = 30$ cows. Ans.

4. Since ·428571 of a guinea $= \frac{3}{7}$ of 21s. = 9s.,
18 lbs. at 9s. = 162s.
and since 112 lbs. at 1s. 6d. = 168s.

therefore you would expect 6s. Ans.

5. (*a*) G. C. M. of 805 and 1311 = 23. Ans.

1	805	1311	1
	506	805	
1	299	506	1
	207	299	
4	92	207	2
	92	184	

23 = G. C. M.

(*b*) L. C. M. of 15863 and 21489 = 11754483,
for $15863 = 29 \times 547$,
and $21489 = 29 \times 741$;
therefore $29 \times 547 \times 741 = 11754483$ = L. C. M.

FEMALES.

1. £5, 5s. : £685, 17s. 9d. :: $12\frac{3}{4}$ yds.
$= \frac{164613\text{d.} \times 51 \text{ qrs.}}{1260\text{d.}} = 1665 \text{ yds. } 2\frac{127}{140} \text{ qrs.}$ Ans.

2. 18s. 10d. : £701, 10s. 10d. :: £1 : £745. Ans.
$\frac{168370 \times £1}{226\text{d.}} = £745.$

3. 573 miles : 764 miles :: 47 tons 8 cwt. 33 lbs.
$\frac{764 \times 106209 \text{ lbs.}}{573} = 63$ tons 4 cwt. 44 lbs. Ans.

4. 9 oxen consume quantity = 30 sheep,
1 ox consumes " $= 3\frac{1}{3}$ "
therefore 72 oxen consume " $= 240$ "

So, by substituting 240 sheep for 72 oxen, the stating of terms is as follows:—

240 sheep : 360 sheep :: 18 acres : x
30 wks. : 45 wks. :: x

$\frac{360 \times 45 \times 18}{30 \times 240} = \frac{81}{2} = 40$ ac. 2 ro. Ans.

Grammar.

1. The two kinds of *participles* are:—the *imperfect* or *incomplete*, expressing an action going on, as *passing, drawing, destroying;* and the *perfect* or *complete*, expressing an action completed, as *past, drawn, destroyed.*

2. *They*—3d pers. pron. com. gen. plu. nom. subj. of *bring.*
their—pronominal poss. adj. or 3d pers. pron. com. gen. plu. poss. attributive to *king.*

3. *Each* and *other* are adjectives when they stand before nouns and qualify them, as *each man, other men;* but when used without the noun they may be considered pronouns, as *two to each;* if they cannot come, invite *others.*

4. NOTES OF A LESSON FOR STANDARD IV.

THE ADVERB.

(1) Introduction.—Write sentences on blackboard, and ask from class words telling (1) *how*, (2) *where*, or (3) *when* a thing was done.

(2) Examples.—John wrote *badly.* He wrote *here.* We wrote *to-day.*

(3) Definition.—An adverb, therefore, tells the *manner, place,* or *time* of an action.

(4) For practice, ask pupils to find adverbs from reading book.

(5) Kinds.—Ask for lists of adverbs of *manner, time, place,* and after explaining that adverbs modify adjectives and other adverbs, ask for adverbs of *degree.*

(6) Inflections.—Show how adverbs like adjectives may be compared.

Geography.

1. The line of *water-parting*, separating the basins of the Thames and Severn from those of rivers flowing into the English Channel, begins in the east of Kent and continues in a very irregular course along the Wealden Heights, the Downs of Hampshire, Salisbury Plain, Exmoor, Dartmoor, and the Cornish Highlands. The most considerable rivers flowing into the English Channel are the Ouse, the Arun, the Itchen, the Test, the Avon, the Frome, the Exe, and the Tamar, all which flow southward.

3. Austrian Empire.—*Physical Features.*—The principal mountain ranges are the *Rhætian Alps*, the *Bohemer Wald*, connected with the *Sudetic Chain*, consisting of the *Erze-Gebirge* and the *Riesen-Gebirge*, which are connected by irregular masses with the great *Carpathian Mountains.*

The chief river is the *Danube*, which with its tributaries drains considerably more than two-thirds of the Empire. These tributaries are the *Iller*, the *Lech*, the *Iser*, the *Inn*, the *Drave*, the *Save*, the *Naab*, the *March* or *Morava*, the *Waag*, and the *Theiss*. Bohemia is watered by the upper courses of the *Elbe*, with its tributary the *Moldau*. The drainage of Galicia belongs to the *Vistula* and the *Dniester*.

Lakes Balaton and Neusiedl are the only ones of any consequence.

The chief *divisions* are—(1) The German Provinces, including *Bohemia*, *Moravia*, *Austria Proper*, and the *Tyrol*. (2) The Slavonian Provinces: *Galicia*, formerly belonging to Poland; *Hungary*, long an independent kingdom; *Transylvania* and *Croatia*. By Treaty of Berlin, *Bosnia* and *Herzegovina* were placed under Austrian protection.

The chief *towns* are *Prague*, an antique city; *Königgrätz*, near battle-field of *Sadowa* (1866); *Brünn*, seat of woollen manufactures; *Austerlitz*, battle 1805; *Vienna*, one of the finest cities in Europe, chief seat of manufactures; *Salzburg*, salt-mines—Haydn and Mozart born here; *Klagenfurt* has white-lead mines; *Idria*, famous quicksilver mines; *Trieste*, chief seaport; *Trent*, famous for Council for settling the Roman Catholic tenets; *Buda* and *Pesth* form one town, the capital of the kingdom of Hungary; *Presburg*, seat of Hungarian Diet; *Schemnitz*, chief of mining towns; *Tokay*, famous for sweet wines; *Orsova*, near the 'Iron Gates' or rapids of the Danube; *Lemberg*, noted for its fair; *Cracow*, ancient capital of Poland, has a lofty mound to the memory of Kosciusko. *Wieliczka* has the most celebrated salt-mines in the world.

The principal *manufactures* are:—*Linen* in Bohemia, Moravia, and Silesia; *woollen* in Moravia and Bohemia; *cotton* in same states; *silk* is a very important industry, and *leather fancy articles* form a conspicuous branch in Vienna; *iron* is also manufactured.

The sovereign is called *emperor* at Vienna because he is there as the ruler of an *empire*; but at Buda he is the ruler of a *kingdom*, and therefore properly a *king*. Austria is an empire, Hungary a kingdom.

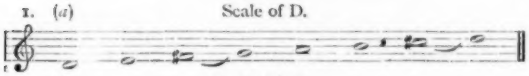
History.

		A.D.		A.D.
1.	Henry I. began to reign	1100;	succeeded by Stephen,	1135
	Richard II. ,,	1378;	,, Henry IV.,	1399
	Richard III. ,,	1483;	,, Henry VII.,	1485
	Elizabeth ,,	1588;	,, James I.,	1603
2.	Charles I.	reigned from 1625 till 1649.		
	Charles II.	,, 1660 ,, 1685.		
	James II.	,, 1685 ,, 1688.		
	William III. and Mary II.	,, 1689 ,, 1702.		
	Anne	,, 1702 ,, 1714.		
3.	1st century began with A.D.	1;	ended with A.D.	100.
	2d ,, ,,	101;	,,	200.
	3d ,, ,,	201;	,,	300, etc.

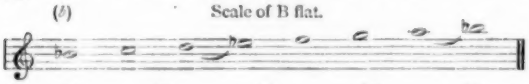
And thus 19th century began with 1801, and ends with 1900.

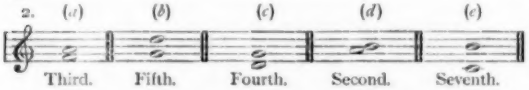
Music.

1. (*a*) Scale of D.



(*b*) Scale of B flat.



2. (*a*) (*b*) (*c*) (*d*) (*e*)

Third. Fifth. Fourth. Second. Seventh.

3. How many quavers are equal to one semibreve? (eight).
How many quavers are equal to one minim? (four).
How many quavers are equal to one crotchet? (two).

SECOND YEAR.

Pupil Teachers at end of Second Year, *if apprenticed on, or after,* **1** *May* **1878; and Pupil Teachers at the end of Third Year, if apprenticed before that date.**

FIRST PAPER.

Three hours and a half allowed.

Arithmetic.

MALES.

1. I sell 185 bushels of wheat for £53, 3s. 9d., thus gaining 15 per cent. At what price per bushel did I buy the wheat?

2. Having £825, I lend it at 3½ per cent. simple interest. In how many years will it amount to £1000, and what amount shall I have to receive at the end of 30 years, nothing having been paid in the meantime?

3. £91·6 amounts in 3·5 years to £105·302083, what is the rate per cent. per annum simple interest?

4. How must nutmegs which cost 18·75s. a lb. be sold so as to gain 16 per cent.?

5. A plumber sold 96 cwt. of lead for £109, 2s. 6d. and gained at the rate of 12½ per cent. What did the lead cost him per cwt.?

FEMALES.

1. Find the least common denominator of—

$$\frac{5}{27},\ \frac{11}{24},\ \frac{5}{6},\ \frac{4}{15},\ \text{and}\ \frac{3}{5}.$$

2. What number added to $\frac{7}{8}+\frac{5}{12}$ will give $2\frac{1}{8}$?

3. Simplify

$$\left(2\tfrac{3}{4}+\frac{5}{2}\ \text{of}\ \frac{7}{3\frac{1}{3}}-\frac{1\frac{1}{3}}{2\frac{1}{2}}\right)1\frac{77}{228}.$$

4. If a person, travelling $13\frac{3}{4}$ hours a day, perform a journey in $27\frac{1}{2}$ days, in what time will he perform the same if he travel $10\frac{1}{4}$ hours a day?

Grammar.

1. And oh when passion rules—how rare
The hours that fall to virtue's share!

Analyse the above, supplying what is needed in the principal sentence, and taking care in your analysis to point out the character of each sentence.

2. Give examples of conjunctions of time, and frame passages with such conjunctions introduced, to show their use.

3. Parse each word in the following:—
'The evil that men do lives after them.'

4. Give notes of a lesson on transitive and intransitive verbs suited to Standard IV. or V.

Geography.

Answer *two* questions only.

1. Describe, as fully as you can, the physical features, chief divisions, towns, and manufactures of the Austrian Empire. What title does the sovereign bear at Vienna, and what at Buda-Pesth? Why are they different?

2. Draw a full map of the Basin of the Ganges; marking its tributaries and chief towns, and noting the point at which the course of the Jumna is nearest that of the Sutlej.

3. Give notes of a lesson on this sentence:—
'*All Europeans, who live in Calcutta or Madras, escape to the hills, if they can, for the hot season.*'
Arrange your notes under these heads:—
(*a*) Who are meant by 'Europeans'? And why are they in India?
(*b*) Where are Calcutta and Madras? Why are they unhealthy in the hot season?
(*c*) What is 'the hot season'? And what are the causes of it?
(*d*) What hills can they go to? Mention any places in the hills.

SECOND PAPER.

One hour allowed for Females, two and a half for Males.

History.

1. What was the extent in time and territory of the Roman occupation of Britain? Compare the condition of the Romans and the Britons nineteen centuries ago.

2. Mention circumstances in the internal condition of England which facilitated the Norman Conquest.

3. Describe the end of Richard II., and tell how the Crown was settled after that event.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Versatility*.

Write, in small hand, as a specimen of copy-setting, *Stirred up by Dorset, Buckingham, and Morton, he comes.*

Composition.

Write full notes of a lesson on *A desert.*

Euclid.

[All generally-understood abbreviations for *words* may be used, but not symbols of *operations*, such as —, +, ×.]

[In solving a rider, only the proposition to which it is appended, and preceding propositions, may be referred to.]

1. If two triangles have two sides of the one equal to two sides of the other, each to each, and have likewise the angles contained by those sides equal to each other; they shall likewise have their bases or third sides equal, and the two triangles shall be equal, and their other angles shall be equal, each to each, viz. those to which the equal sides are opposite.

ABDE, BFGC are squares on two sides of the triangle ABC, and AF, CD are joined; show that AF, CD are equal.

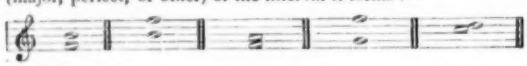
2. The greater side of every triangle is opposite to the greater angle.

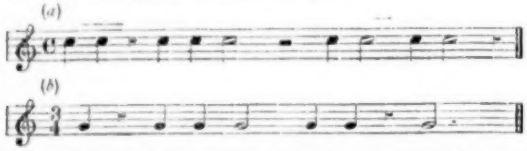
Point out where the *demonstration* begins.

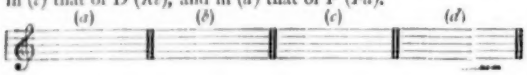
Music.

A quarter of an hour allowed for this paper.

1. Write under each of the following the name and quality (major, perfect, or other) of the interval it forms :—



2. Divide (by bars) the notes in (*a*) into measures of common time; those in (*b*) into measures of triple :—

3. Write in (*a*) the signature of A (*La*), in (*b*) that of B♭ (*Se*), in (*c*) that of D (*Re*), and in (*d*) that of F (*Fa*).



ANSWERS.—SECOND YEAR.

Arithmetic.

MALES.

1. 1 bushel is sold at 5s. 9d.;
$\therefore$ 115 : 100 :: 5s. 9d. : 5s. Ans.

2. Interest on £825 for time = £175;
$\therefore$ £825 : £100 :: 1 year
$3\frac{1}{2}$: 175
$$\frac{100 \times 175 \times 1}{825 \times 3\frac{1}{2}} = 6\frac{2}{33} \text{ years.}$$

2. (*b*) Interest of £825 for 30 years at $3\frac{1}{2}$ per cent.
$$= \frac{825 \times 30 \times 3\frac{1}{2}}{100} = £866,\ 5s.;$$
$\therefore$ £866, 5s. + £825 = £1691, 5s., the amount. Ans.

3. Prin., £91·6 = $91\frac{3}{5}$ = £ 91 13 4
Amt., £105·302083 = 105 6 $0\frac{1}{2}$
$\therefore$ interest = 13 12 $8\frac{1}{2}$
£$91\frac{3}{5}$: £100 :: £13, 12s. $8\frac{1}{2}$d.
$3\frac{1}{2}$ yrs. : 1 yr.
$$\frac{100 \times £13,\ 12s.\ 8\frac{1}{2}d.}{91\frac{3}{5} \times 3\frac{1}{2}} = £4\frac{1}{4} \text{ rate p. c. Ans.}$$

4. 100s. : 116s. :: 18·75s. : 21s. 9d.
$$\frac{116 \times 18{\cdot}75}{100} = £1,\ 1s.\ 9d. \text{ Ans.}$$

5. $112\frac{1}{2}$: 100 :: £$109\frac{1}{2}$: prime cost of 96 cwt.
$$\frac{100 \times 109\frac{1}{2}}{112\frac{1}{2}} = £97;$$
$\therefore$ the price of 1 cwt. = £97 ÷ 96 = £1, 0s. $0\frac{1}{4}$d.

FEMALES.

1. The least common denominator = L. C. M. of denominators of fractions.
L. C. M. of 27, 24, 6, 15, 5 = 27 × 8 × 5 = 1080 L. C. D.

2. The problem may be written thus :—
$$\frac{17}{8} - \left(\frac{7}{8} + \frac{5}{12}\right), \text{ or } \frac{51}{24} - \frac{21+10}{24} = \frac{51-31}{24} = \frac{5}{6}. \text{ Ans.}$$

3. This problem $= \left(\frac{11}{4} + \frac{5 \times 35}{2 \times 19} - \frac{5 \times 2}{3 \times 5}\right) \frac{305}{228}$
$$= \left(\frac{11}{4} + \frac{175}{38} - \frac{2}{3}\right) \frac{305}{228}$$
$$= \left(\frac{627 + 1050 - 152}{228}\right) \frac{305}{228}$$
$$= \frac{1525 \times 305}{228 \times 228}$$
$$= \frac{465125}{51984} = 8\frac{49353}{51984}.$$

4. $10\frac{1}{4}$ hours : $13\frac{3}{8}$ hours :: $27\frac{5}{8}$ days :
$$\frac{13\frac{3}{8} \times 27\frac{5}{8}}{10\frac{1}{4}} = \frac{7 \times 55 \times 221}{72 \times 4 \times 8} = \frac{85085}{2304} = 36\frac{2141}{2304} \text{ days. Ans.}$$

Grammar.

Sentence.	Subject.	Predicate.	Completion.	Extension.
(1)				
And oh when passion rules. (*Adverbial sentence, subordinate to* (2).)	(And oh when) passion	rules	...	...
(2)				
How rare (*are*) the hours. (*Principal sentence.*)	the hours	are rare	...	How
(3)				
That fall to virtue's share. (*Adjective sent. subordinate to 'hours.'*)	That	fall	to virtue's share	...

2. The conjunctions of *time* are :—*when, while, as, until, ere, before, after.*

SENTENCES.

I will come *when* I am at leisure.
I will praise thee *while* I live.
As I looked some one came near.
They remained *until* night set in.
It will be long *ere* you have such a chance.
The truth will come out *before* you have done.
After the vote was taken, the assembly broke up.

3. *The*—def. art. or dist. adj. qual. *evil.*
evil—abs. noun, neut. sing. nom. subj. of *lives.*
that—simple rel. 3d pers. sing. neut. (agr. with *evil*), obj. gov. by *do.*
men—com. noun, masc. plur. nom. subj. of *do.*
do—3d pers. plur. pres. ind. irreg. trans. verb, *do, dia, done*, agr. with *men.*
lives—3d pers. sing. pres. ind. reg. intrans. verb *to live*, agr. with *evil.*
after—prep. gov. *them.*
them—3d pers. pron. plur. masc. (agr. with *men*), obj. by *after.*

4. NOTES OF LESSON.

ON TRANSITIVE AND INTRANSITIVE VERBS.

(1) Write on blackboard such sentences as: 'Tom *strikes* the dog.' 'He *ate* the apple.' Show that *strikes* without some object would give an incomplete idea; that *ate* is another verb requiring an object.

(2) Write also such sentences as: 'Tom *runs.*' 'He *sings.*' 'She *sleeps.*' Show that *runs, sings, sleeps*, complete the meaning in themselves, and do not require an object.

(3) Explain now that *transitive* means a passing over of the action from the subject to the object, and that *intransitive* means a confining of the action of the verb to its subject.

(4) Now may be introduced the *Passive voice*, which belongs only to transitive verbs.

Geography.

1. *See same question fully answered, under Geography of First Year.*

3. NOTES OF LESSON.

(*a*) By 'Europeans' are meant those British or others from Europe who are resident in India, and serve the Governmen', whether as soldiers or civil servants, also civilians as merchants.

(*b*) *Calcutta*, situated on the Hooghly, a branch of the Ganges, is the capital of British India. *Madras*, on the Coromandel

coast, on the Bay of Bengal, capital of the Madras Presidency. Both cities are unhealthy during the hot season from the malaria, or noxious vapours which cause fever.

(*c*) 'The hot season' is the period when the tropical sun strikes the earth with almost vertical rays. The land becomes parched and brown, the small rivers dry up, and the heat is almost unbearable. It lasts from March to June.

(*d*) The heat is much subdued on the hills, to which Europeans go to regain their health. The places most frequented by invalids are: *Darjeeling*, south of Sikkim, *Simla* in the Punjaub, *Mount Aboo* in the Aravulli range, *Mahabuleshwar*, and the *Neilgherries*.

History.

1. The Romans invaded Britain under Julius Cæsar 55 and 54 B.C., but it was not until A.D. 43 that a footing was obtained in the island, which they held till the withdrawal of the Roman legions in A.D. 410. They conquered all the country now corresponding to the present England, Wales (partly), and Scotland as far as to the line between the Friths of Forth and Clyde.

Nineteen centuries ago, the Romans were the conquerors of the then known world. They were so skilled and powerful in war, that no nation dared withstand them. They were wise, brave, and laborious. Compared with the Romans, the Britons were mere barbarians, and to their conquerors they were indebted for the making of roads, the construction of houses, principles of good government, for a proper coinage, and the development of the wealth of the country.

2. The Norman Conquest was partially facilitated by Edward the Confessor introducing the French language and customs among the Saxon nobility, thus forming a faction favourable to William's government. After the battle of Hastings, the Norman and Saxon aristocracy intermarried, and thus consolidated the new power.

3. Richard II., after being deposed by Henry Bolingbroke, Duke of Lancaster, was imprisoned in Pontefract Castle, where it is supposed he met a violent death. Henry succeeded to the throne as Henry IV., and was the first sovereign of the House of Lancaster (1399).

NOTES OF A LESSON.

A DESERT.

Definition.—A desert is a barren tract of country, generally covered with sand or rocks.

Description.—Covered with hot shining sand, which hurts the eyes and burns the feet. No water. Hot winds sometimes arise called 'sirocco' and 'simoom.' Travellers throw themselves down till the storms pass. Here and there a fertile spot occurs, where travellers refresh themselves. Such spots called 'oases,' having water, green grass, and palm trees.

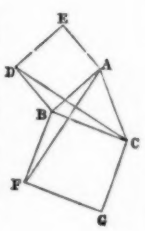
How crossed.—The camel called the 'Ship of the Desert.' Peculiarly adapted for long journeys, from the formation of stomach and the hump of fat on its back. Can close its eyes and nostrils against the 'hot wind.' Travellers form a caravan for protection against robbers. Water carried from oasis to oasis in skins.

Examples of Deserts.—*Sahara* in Africa, the *Stony Desert* in Arabia, the *Prairies* of North America, *Sandy Landes* of France, the *Maremme* of Italy, the *Steppes* of Siberia.

Euclid.

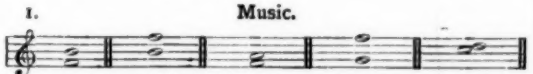
1. Prop. 4, Book I.

Rider.—Let ABC be a triangle. On AB, BC describe the squares ABDE, BFGC, and join AF, CD. Then AF shall be equal to CD.

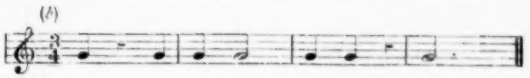


Since AB = BD and CB = BF, being sides of squares, and since all right angles are equal to one another, then the angle DBA = angle FBC. To each add angle ABC; then the whole angle DBC = whole angle ABF, and the sides containing these angles are equal, each to each, viz. DB, BA respectively equal to AB, BF, and therefore by Prop. 4 the base AF = base CD. Q.E.D.

Music.

1.

Perfect 4th. Imperfect 5th. Major 3d. Minor 7th. Major 2d.

2. (*a*)

(*b*)

3. (*a*) (*b*) (*c*) (*d*)

THIRD YEAR.

Pupil Teachers at end of Third Year, *if apprenticed on, or after,* **1st *May* 1878; and Pupil Teachers at end of Fourth Year, if apprenticed before that date.**

FIRST PAPER.

Three hours and a half allowed.

Arithmetic.

MALES.

1. A gives B £63, 17s. 6d. as payment of a loan and interest, at the rate of $3\frac{3}{8}$ per cent. The money was lent $3\frac{3}{4}$ years before. What was the amount of the loan?

2. A person has $\frac{1}{4}$ of a ship worth £6600, and insured for 91·25 per cent. of its real value; what amount of damage would he sustain in case of the ship being lost?

3. £825 for ·825 of a year at 8·25 per cent.: find simple interest and amount.

4. At what price per yard must cloth be sold to gain 17 per cent., if by selling 109 yards of it for £46, 6s. 6d., 8 per cent. be gained?

5. Divide £10,000 among A, B, C, so that A may have half as much again as B, and B a third as much again as C.

FEMALES.

1. Find the sum, difference, product, and quotient—the greater being divided by the less—of 1·015 and ·01015.

2. Find the difference between $6\frac{1}{2}$ half guineas and £3·525; and reduce the result to the decimal of a crown.

3. Add $5\frac{1}{2}$ cwt. to 3·125 qrs.; and reduce the sum to the decimal of a ton.

Grammar.

1. Words or phrases attached to the nouns of a sentence are called *enlargements*, attached to the verbs they are called *extensions*. Give two examples of each.

2. 'Dost thou so *hunger* for my empty chair
That thou wilt *needs invest* thee with mine honours?
Stay but a little; for my cloud of dignity
Is held from *falling* with so weak a wind
That it will quickly drop.'

SHAKESPEARE, *Henry IV.*

(*a*) Analyse the last three lines.

(*b*) Parse the words in italics.

(*c*) Give the meaning of the above passage in your own words, explaining, so far as you can, the figures and metaphors.

3. What are the Latin prepositions that mean *out of, from, under?* Give examples of words in which they occur, pointing out the force of the preposition in each case.

Geography.

Answer two Questions only; but Nos. 1 and 2 *if you can.*

1. Give notes of a lesson on this sentence:—

'*All Europeans, who live in Calcutta or Madras, escape to the hills, if they can, for the hot season.*'

Arrange your notes under these heads:—

(*a*) Who are meant by 'Europeans,' and why are they in India?

(*b*) Where are Calcutta and Madras? Describe *exactly* the situation of each.

(*c*) What is the hot season, and what are the causes of it?

(*d*) What hills can they go to? Name any places in the hills.

2. Draw a map, showing the courses of the Senegal and the Quorra or Niger, and the coast-line between their mouths.

3. Describe the East Coast of Africa, and the islands opposite to it.

SECOND PAPER.

One hour allowed for Females, two and a half for Males.

Euclid.

[All generally-understood abbreviations for *words* may be used, but not symbols of *operations*, such as −, +, ×.]

1. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three

Euclid.

[All generally-understood abbreviations for *words* may be used, but not symbols of *operations*, such as —, +, ×.]

[In solving a rider, only the proposition to which it is appended, and preceding propositions, may be referred to.]

1. If two triangles have two sides of the one equal to two sides of the other, each to each, and have likewise the angles contained by those sides equal to each other; they shall likewise have their bases or third sides equal, and the two triangles shall be equal, and their other angles shall be equal, each to each, viz. those to which the equal sides are opposite.

ABDE, BFGC are squares on two sides of the triangle ABC, and AF, CD are joined; show that AF, CD are equal.

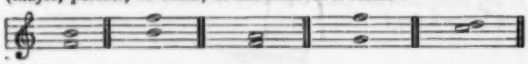
2. The greater side of every triangle is opposite to the greater angle.

Point out where the *demonstration* begins.

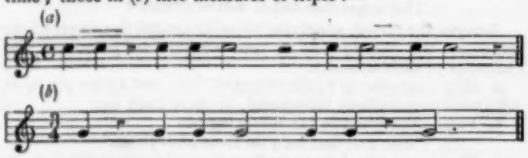
Music.

A quarter of an hour allowed for this paper.

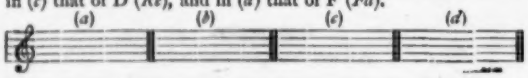
1. Write under each of the following the name and quality (major, perfect, or other) of the interval it forms :—



2. Divide (by bars) the notes in (*a*) into measures of common time; those in (*b*) into measures of triple :—



3. Write in (*a*) the signature of A (*La*), in (*b*) that of B♭ (*Se*), in (*c*) that of D (*Re*), and in (*d*) that of F (*Fa*).



ANSWERS.—SECOND YEAR.

Arithmetic.

MALES.

1. 1 bushel is sold at 5s. 9d.;
$\therefore$ 115 : 100 :: 5s. 9d. : 5s. Ans.

2. Interest on £825 for time = £175;
$\therefore$ £825 : £100 :: 1 year
$3\frac{1}{2}$: 175
$$\frac{100 \times 175 \times 1}{825 \times 3\frac{1}{2}} = 6\frac{2}{33} \text{ years.}$$

2. (*b*) Interest of £825 for 30 years at $3\frac{1}{2}$ per cent.
$$= \frac{825 \times 30 \times 3\frac{1}{2}}{100} = £866,\ 5s.;$$
$\therefore$ £866, 5s. + £825 = £1691, 5s., the amount. Ans.

3. Prin., £91·6 = $91\frac{1}{5}$ = £ 91 13 4
Amt., £105·302083 = 105 6 $0\frac{1}{2}$
$\therefore$ interest = 13 12 $8\frac{1}{2}$
£$91\frac{1}{5}$: £100 :: £13, 12s. $8\frac{1}{2}$d.
$3\frac{1}{2}$ yrs. : 1 yr.
$$\frac{100 \times £13,\ 12s.\ 8\frac{1}{2}d.}{91\frac{1}{5} \times 3\frac{1}{2}} = £4\frac{1}{2} \text{ rate p. c. Ans.}$$

4. 100s. : 116s. :: 18·75s. : 21s. 9d.
$$\frac{116 \times 18{\cdot}75}{100} = £1,\ 1s.\ 9d. \text{ Ans.}$$

5. $112\frac{1}{2}$: 100 :: £$109\frac{1}{2}$: prime cost of 96 cwt.
$$\frac{100 \times 109\frac{1}{2}}{112\frac{1}{2}} = £97;$$
$\therefore$ the price of 1 cwt. = £97 ÷ 96 = £1, 0s. $0\frac{1}{4}$d.

FEMALES.

1. The least common denominator = L. C. M. of denominators of fractions.
L. C. M. of 27, 24, 6, 15, 5 = 27 × 8 × 5 = 1080 L. C. D.

2. The problem may be written thus :—
$\frac{17}{8} - \left(\frac{7}{8} + \frac{5}{12}\right)$, or $\frac{51}{24} - \frac{21+10}{24} = \frac{51-31}{24} = \frac{5}{6}$. Ans.

3. This problem $= \left(\frac{11}{4} + \frac{5 \times 35}{2 \times 19} - \frac{5 \times 2}{3 \times 5}\right) \frac{305}{228}$
$= \left(\frac{11}{4} + \frac{175}{38} - \frac{2}{3}\right) \frac{305}{228}$
$= \left(\frac{627 + 1050 - 152}{228}\right) \frac{305}{228}$
$= \frac{1525 \times 305}{228 \times 228}$
$= \frac{465125}{51984} = 8\frac{49353}{51984}$.

4. $10\frac{1}{2}$ hours : $13\frac{3}{8}$ hours :: $27\frac{1}{2}$ days :
$$\frac{13\frac{3}{8} \times 27\frac{1}{2}}{10\frac{1}{2}} = \frac{7 \times 55 \times 221}{72 \times 4 \times 8} = \frac{85085}{2304} = 36\frac{2141}{2304} \text{ days. Ans.}$$

Grammar.

Sentence.	Subject.	Predicate.	Completion.	Extension.
(1)				
And oh when passion rules. (*Adverbial sentence, subordinate to* (2).)	(And oh when) passion	rules	...	...
(2)				
How rare (*are*) the hours. (*Principal sentence.*)	the hours	are rare	...	How
(3)				
That fall to virtue's share. (*Adjective sent. subordinate to 'hours.'*)	That	fall	to virtue's share	...

2. The conjunctions of *time* are :—*when, while, as, until, ere, before, after.*

SENTENCES.

I will come *when* I am at leisure.
I will praise thee *while* I live.
As I looked some one came near.
They remained *until* night set in.
It will be long *ere* you have such a chance.
The truth will come out *before* you have done.
After the vote was taken, the assembly broke up.

3. *The*—def. art. or dist. adj. qual. *evil.*
evil—abs. noun, neut. sing. nom. subj. of *lives.*
that—simple rel. 3d pers. sing. neut. (agr. with *evil*), obj. gov. by *do.*
men—com. noun, masc. plur. nom. subj. of *do.*
do—3d pers. plur. pres. ind. irreg. trans. verb, *do, dia, done*, agr. with *men.*
lives—3d pers. sing. pres. ind. reg. intrans. verb *to live*, agr. with *evil.*
after—prep. gov. *them.*
them—3d pers. pron. plur. masc. (agr. with *men*), obj. by *after.*

4. NOTES OF LESSON.

ON TRANSITIVE AND INTRANSITIVE VERBS.

(1) Write on blackboard such sentences as: 'Tom *strikes* the dog.' 'He *ate* the apple.' Show that *strikes* without some object would give an incomplete idea; that *ate* is another verb requiring an object.

(2) Write also such sentences as: 'Tom *runs*.' 'He *sings*.' 'She *sleeps*.' Show that *runs, sings, sleeps*, complete the meaning in themselves, and do not require an object.

(3) Explain now that *transitive* means a passing over of the action from the subject to the object, and that *intransitive* means a confining of the action of the verb to its subject.

(4) Now may be introduced the *Passive voice*, which belongs only to transitive verbs.

Geography.

1. *See same question fully answered, under Geography of First Year.*

3. NOTES OF LESSON.

(*a*) By 'Europeans' are meant those British or others from Europe who are resident in India, and serve the Government, whether as soldiers or civil servants, also civilians as merchants.

(*b*) *Calcutta*, situated on the Hooghly, a branch of the Ganges, is the capital of British India. *Madras*, on the Coromandel

coast, on the Bay of Bengal, capital of the Madras Presidency. Both cities are unhealthy during the hot season from the malaria, or noxious vapours which cause fever.

(*c*) 'The hot season' is the period when the tropical sun strikes the earth with almost vertical rays. The land becomes parched and brown, the small rivers dry up, and the heat is almost unbearable. It lasts from March to June.

(*d*) The heat is much subdued on the hills, to which Europeans go to regain their health. The places most frequented by invalids are: *Darjeeling*, south of Sikkim, *Simla* in the Punjaub, *Mount Aboo* in the Aravulli range, *Mahabuleshwar*, and the *Neilgherries*.

History.

1. The Romans invaded Britain under Julius Cæsar 55 and 54 B.C., but it was not until A.D. 43 that a footing was obtained in the island, which they held till the withdrawal of the Roman legions in A.D. 410. They conquered all the country now corresponding to the present England, Wales (partly), and Scotland as far as to the line between the Friths of Forth and Clyde.

Nineteen centuries ago, the Romans were the conquerors of the then known world. They were so skilled and powerful in war, that no nation dared withstand them. They were wise, brave, and laborious. Compared with the Romans, the Britons were mere barbarians, and to their conquerors they were indebted for the making of roads, the construction of houses, principles of good government, for a proper coinage, and the development of the wealth of the country.

2. The Norman Conquest was partially facilitated by Edward the Confessor introducing the French language and customs among the Saxon nobility, thus forming a faction favourable to William's government. After the battle of Hastings, the Norman and Saxon aristocracy intermarried, and thus consolidated the new power.

3. Richard II., after being deposed by Henry Bolingbroke, Duke of Lancaster, was imprisoned in Pontefract Castle, where it is supposed he met a violent death. Henry succeeded to the throne as Henry IV., and was the first sovereign of the House of Lancaster (1399).

NOTES OF A LESSON.

A DESERT.

Definition.—A desert is a barren tract of country, generally covered with sand or rocks.

Description.—Covered with hot shining sand, which hurts the eyes and burns the feet. No water. Hot winds sometimes arise called 'sirocco' and 'simoom.' Travellers throw themselves down till the storms pass. Here and there a fertile spot occurs, where travellers refresh themselves. Such spots called 'oases,' having water, green grass, and palm trees.

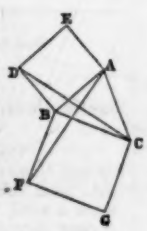
How crossed.—The camel called the 'Ship of the Desert.' Peculiarly adapted for long journeys, from the formation of stomach and the hump of fat on its back. Can close its eyes and nostrils against the 'hot wind.' Travellers form a caravan for protection against robbers. Water carried from oasis to oasis in skins.

Examples of Deserts.—*Sahara* in Africa, the *Stony Desert* in Arabia, the *Prairies* of North America, *Sandy Landes* of France, the *Maremme* of Italy, the *Steppes* of Siberia.

Euclid.

1. Prop. 4, Book I.

Rider.—Let ABC be a triangle. On AB, BC describe the squares ABDE, BFGC, and join AF, CD. Then AF shall be equal to CD.



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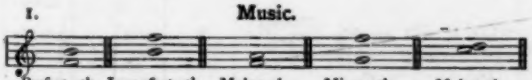
Music.

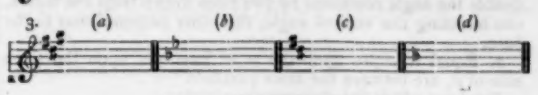
1.



2. (*a*)

(*b*)

3. (*a*) (*b*) (*c*) (*d*)



THIRD YEAR.

Pupil Teachers at end of Third Year, *if apprenticed on, or after, 1st May* 1878; and Pupil Teachers at end of Fourth Year, if apprenticed before that date.

FIRST PAPER.

Three hours and a half allowed.

Arithmetic.

MALES.

1. A gives B £63, 17s. 6d. as payment of a loan and interest, at the rate of 3½ per cent. The money was lent 3½ years before. What was the amount of the loan?

2. A person has ¼ of a ship worth £6600, and insured for 91·25 per cent. of its real value; what amount of damage would he sustain in case of the ship being lost?

3. £825 for ·825 of a year at 8·25 per cent.: find simple interest and amount.

4. At what price per yard must cloth be sold to gain 17 per cent., if by selling 109 yards of it for £46, 6s. 6d., 8 per cent. be gained?

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FEMALES.

1. Find the sum, difference, product, and quotient—the greater being divided by the less—of 1·015 and ·01015.

2. Find the difference between 6½ half guineas and £3·525; and reduce the result to the decimal of a crown.

3. Add 5½ cwt. to 3·125 qrs.; and reduce the sum to the decimal of a ton.

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1. Words or phrases attached to the nouns of a sentence are called *enlargements*, attached to the verbs they are called *extensions*. Give two examples of each.

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That thou wilt *needs invest* thee with mine honours?
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SHAKESPEARE, *Henry IV.*

(*a*) Analyse the last three lines.

(*b*) Parse the words in italics.

(*c*) Give the meaning of the above passage in your own words, explaining, so far as you can, the figures and metaphors.

3. What are the Latin prepositions that mean *out of, from, under?* Give examples of words in which they occur, pointing out the force of the preposition in each case.

Geography.

Answer two Questions only; but Nos. 1 and 2 *if you can.*

1. Give notes of a lesson on this sentence:—

'*All Europeans, who live in Calcutta or Madras, escape to the hills, if they can, for the hot season.*'

Arrange your notes under these heads:—

(*a*) Who are meant by 'Europeans,' and why are they in India?

(*b*) Where are Calcutta and Madras? Describe *exactly* the situation of each.

(*c*) What is the hot season, and what are the causes of it?

(*d*) What hills can they go to? Name any places in the hills.

2. Draw a map, showing the courses of the Senegal and the Quorra or Niger, and the coast-line between their mouths.

3. Describe the East Coast of Africa, and the islands opposite to it.

SECOND PAPER.

One hour allowed for Females, two and a half for Males.

Euclid.

[All generally-understood abbreviations for *words* may be used, but not symbols of *operations*, such as —, +, ×.]

1. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three

interior angles of every triangle are together equal to two right angles.

The difference of the angles at the base of any triangle is double the angle contained by two lines drawn from the vertex, one bisecting the vertical angle, the other perpendicular to the base.

2. Equal triangles upon the same base and upon the same side of it, are between the same parallels.

Point out where the *demonstration* begins.

History.

1. Explain the relations of Mary Stuart to the thrones of Scotland, England, and France.

2. How did Charles I. regard Parliament? What were the consequences?

3. Show the descent of Queen Victoria from James I.; and compare the extent of dominion of the two monarchs.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Versatility*.

Write, in small hand, as a specimen of copy-setting, '*Stirred up by Dorset, Buckingham, and Morton, he comes.*'

Composition.

Write from memory the substance of the passage read to you by the Inspector.

Algebra.

1. Simplify $a-(b-c)-\{b-(a-c)\}-[a-\{2b-(a-c)\}]$; and show that

$$\frac{a+c}{(a-b)(x-a)}-\frac{b+c}{(a-b)(x-b)}=\frac{x+c}{(x-a)(x-b)}.$$

2. Find the G. C. M. of $a^3(b^4-b^2c^2)$ and $b^3(ab+ac)^2$.

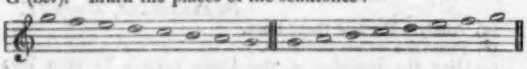
3. Solve the equations:—

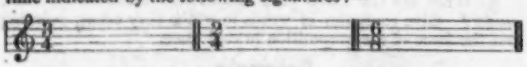
(1) $\frac{7\cdot1-3x}{\cdot5}-\cdot8x=9\cdot44.$

(2) $\frac{12}{x}+\frac{1}{12x}=\frac{29}{24}.$

Music.

A quarter of an hour allowed for this paper.

1. Complete the following (by inserting the necessary sharps or flats) as a descending and ascending diatonic minor scale of G (*Sol*). Mark the places of the semitones:—

2. Write a measure, of rests only, in each of the kinds of time indicated by the following signatures:—



3. Write over each of the following the name of the major scale, and under each that of the minor scale of which it is the signature:—

ANSWERS.—THIRD YEAR.

Arithmetic.

MALES.

1. Interest of £100 for $3\frac{3}{4}$ years at $3\frac{3}{4}$ per cent.

$$=\frac{100\times3\frac{3}{4}\times3\frac{3}{4}}{100}=£14\tfrac{1}{16};$$

$\therefore 14\frac{1}{16}:100::£63\frac{3}{4}:£56,$

that is, $\frac{1825}{16}:\frac{100}{1}::£\frac{511}{8}.$

$$\frac{16\times100\times511}{1825\times8}=£56.\ \text{Ans.}$$

2. Since 8·75 per cent. is lost, therefore

100 : 8·75 :: £6600 : £577, 10s.

$\frac{1}{4}$ of £577, 10s. = £82, 10s. Ans.

3. Interest $=\frac{£825\times\cdot825\times8\cdot25}{100}=£56\cdot15625$

	£	s.	d.
= interest =	£56	3	$0\frac{1}{2}\frac{1}{2}$
	825	0	0

$\therefore$ amount = £881 3 $0\frac{1}{2}\frac{1}{2}$. Ans.

4. 109 yds. cost £46, 6s. 6d.

1 yd. ,, 8s. 6d.

108 : 117 :: 8s. 6d. : 9s. $2\frac{1}{2}$d. Ans.

5. To avoid fractions, suppose C has 3 shares;

then B ,, 4 ,,

and A ,, 6 ,,

Total, 13 shares.

So C gets $\frac{3}{13}$ of £10,000 or £2307, 13s. $10\frac{4}{13}$d. Ans.

B ,, $\frac{4}{13}$,, ,, ,, £3076, 18s. $5\frac{7}{13}$d. ,,

A ,, $\frac{6}{13}$,, ,, ,, £4615, 7s. $8\frac{1}{13}$d. ,,

FEMALES.

1.

(1) Sum.	(2) Difference
1·015	1·015
·01015	·01015
1·02515. Ans.	1·00485. Ans.

(3) Product.	(4) Quotient.
1·015	·01015) 1·015 (100. Ans.
·01015	1·015
5075	
1015	
1015	
·01030225. Ans.	

2.

	£	s.	d.
$6\frac{1}{2}$ half-guineas =	3	8	3
£3·525 =	3	10	6
Difference =		2	3

Reducing 2s. 3d. to the decimal of 5s.

$= \frac{27}{60}$d. = ·45. Ans.

3. $5\frac{1}{2}$ cwts. = 22 qrs.,

and 3·125 qrs. + 22 qrs. = 25·125 qrs.,

which reduced to the decimal of a ton

$$=\frac{25\cdot125}{80}\text{ qrs.}=\cdot3140625.\ \text{Ans.}$$

Grammar.

EXAMPLES OF ENLARGEMENTS.

1. (1) *The queenly* form is shattered.
(2) The sound *of the hunters' horns* is heard.

EXAMPLES OF EXTENSIONS.

(1) *Sweetly* smiled the morn.
(2) The baron died *in his chamber dull.*

2. (*a*)

Sentence.	Connective.	Subject.	Predicate.	Completion.	Extensions.
(1) Stay but a little. (*Principal.*)	...	(thou)	stay	...	but a little (*time*).
(2) For my cloud of dignity is held from falling with so weak a wind. (*Adverbial of cause subord. to* (1).)	for	my cloud of dignity	is held	from falling	with so weak a wind (*manner*).
That it will quickly drop. (*Adverbial of consequence to* (2).)	that	it	will drop	...	quickly (*time*).

(*b*) *Hunger*—pres. inf. reg. intrans. verb *to hunger.*
dost hunger—interrog. form, 2d pers. sing. pres. indic. agr. with *thou.*

needs—adv. mod. *invest.*
invest—pres. inf. reg. trans. verb *to invest.*
will invest—2d pers. sing. fut. indic. agr. with *thou.*
stay—reg. intrans. verb, imper. mood, 2d pers. agr. with subj. *thou.*
falling—irreg. intrans. verb (*fall, fell, fallen*), pres. part., gov. by *from.*
that—conj. connect. subord. clause with principal.

(*c*) Are you so anxious to get possession of my position that you are already considering yourself entitled to the honours which belong to me? Have patience a short time longer, for I shall soon be obliged to lay aside my authority for want of supporters.

Notes.—'Hunger for my chair'—a metaphorical expression taken from the anxiety of a hungry person to get food.

'Chair'—metonymy for 'office;' a similar expression to 'desiring the throne'—that is, 'wishing to be king.'

'Invest thee with mine honour'—a metaphor taken from the ceremony of clothing a person in robes of office.

'For my cloud of dignity,' etc.—a metaphor taken from the fact that the clouds are supported by the atmosphere, which carries them until they become too dense, when they descend as rain.

'Stay but a little'—an implied metaphor, equal to 'Control yourself.'

3. *e* or *ex* means *out of*, as { *e*-ject, to cast out of. / *ex*-tract, to draw out of.
a, ab, abs ,, *from*, as { *a*-vert, to turn from. / *ab*-duct, to lead from. / *abs*-tract, to draw from.
sub ,, *under*, as { *sub*-way, a road under. / *sub*-tract, to draw from under.

Geography.

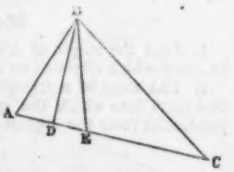
1. *See same question answered in Geography of 'Second Year.'*

3. The east coast of Africa extends in a north-easterly direction from *Delagoa Bay* to the *Gulf of Aden.* The principal projections occur at *C. Corrientes*, the town of *Mozambique*, *C. Delgado*, and *C. Guardafui.* The openings in the coast are Sofala Bay and the *Bight of Zanzibar.* The coast is alluvial, with mountains in the interior. The only river of any importance is the *Zambesi.* The political divisions are *Sofala, Mozambique, Zanzibar, Ajan*, and *Somali.* The towns on the coast are *Inhambane, Sofala, Quilamane, Mozambique, Zanzibar* on an island, and *Magadoxa.* Off the coast is the large island of *Madagascar*, with its capital, Tananarivo. It is a beautiful island, with lofty mountains in the interior, and is separated from the mainland by the *Channel of Mozambique.* The other islands are *Bourbon*, ch. town *St. Denis; Mauritius*, ch. town *Port Louis* (belongs to Britain); *Comoro Isles*, north of Madagascar; *Socotra*, isle near C. Guardafui; the *Seychelles* and *Amirante Islands* belong to Britain, and lie out in the Indian Ocean, opposite Zanzibar.

Euclid.

1. Prop. 31, Book I.

Rider.—Let ABC be a triangle. From B let fall the perpendicular BD, and bisect the angle ABC by the straight line BE. Then the difference of the angles BAC, ACB shall be equal to twice the angle DBE. Now, since the angles DAB, ABD are together equal to a right angle, and that DCB, GBD are also equal to a right angle; ∴ DAB, ABD are equal to the angles DCB, DBC taken together. Add DBE to these equals, and then the angles DAB, ABD, DBE = angles DCB, DBC, DBE taken together, or DAB, ABD, DBE together = angles DCB, CBE, and twice angle DBE. But ABD, DBE together = half angle ABC = CBE; ∴ the remaining angle DAB = angle DCB and twice DBE—that is, the angle DAB is greater than DCB by twice the angle DBE. Q.E.D.



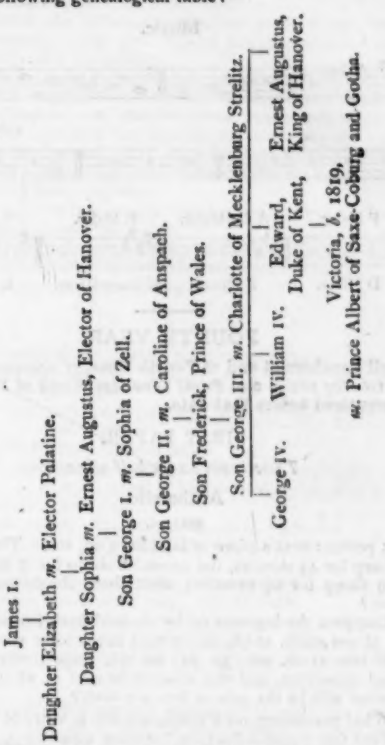
2. Prop. 39, Book I.

History.

1. Mary Stuart, daughter of James V. of Scotland, succeeded him as Queen of Scots. She was the grand-niece of Henry VIII., and, setting Elizabeth aside, she had the best claim to the throne of England. As the wife of Francis II. she was Queen of France.

2. Charles I. regarded Parliament merely as an assembly at his service for raising money. His own words respecting Parliament were: 'Parliaments are altogether in my power for their calling, sitting, and dissolution; and therefore as I find the fruit of them to be good or evil, they are to continue or not to be.' His obstinacy led to civil war, and to his own execution (1649).

3. The descent of Queen Victoria from James I. is best seen from the following genealogical table:—


James I.
Daughter Elizabeth m. Elector Palatine.
Daughter Sophia m. Ernest Augustus, Elector of Hanover.
Son George I. m. Sophia of Zell.
Son George II. m. Caroline of Anspach.
Son Frederick, Prince of Wales.
Son George III. m. Charlotte of Mecklenburg Strelitz.
George IV.
William IV.
Edward, Duke of Kent,
Ernest Augustus, King of Hanover.
Victoria, b. 1819,
m. Prince Albert of Saxe-Coburg and Gotha.

At the time of James I. the British Empire, besides the British Isles, included only small portions of the continent of North America; but now the British Empire, besides the British Isles, includes possessions in Europe with an area of 120,000 sq. miles; in India, an area nineteen times that of Great Britain; in Ceylon, an area half that of England; in Australia and New Zealand, an area equal to Europe; in North America, an area 30 times that of Great Britain; in the West Indies, Honduras, and Guiana, an area exceeding that of Great Britain; in South Africa, an area four times that of Great Britain; and in West Africa, an area equal to half that of England.

Algebra.

1. (*a*) $a-(b-c)-\{b-a(a-c)\}-[a-\{2b-(a-c)\}]$
$=a-b+c-\{b-a+c\}-[a-\{2b-a+c\}]$
$=a-b+c-b+a-c-[a-2b+a-c]$
$=a-b+c-b+a-c-a+2b-a+c=c.$ Ans.

(*b*) Reducing to a common denominator, we get

$$\frac{(a+c)(x-b)-(b+c)(x-a)}{(a-b)(x-a)(x-b)}$$
$$=\frac{(ax+cx-ab-bc)-(bx+cx-ab-ac)}{(a-b)(x-a)(x-b)}$$
$$=\frac{ax+cx-ab-bc-bx-cx+ab+ac}{(a-b)(x-a)(x-b)}$$
$$=\frac{ax-bx+ac-bc}{(a-b)(x-a)(x-b)}=\frac{(a-b)x+(a-b)c}{(a-b)(x-a)(x-b)}$$
$$=\frac{(a-b)(x+c)}{(a-b)(x-a)(x-b)},$$

and after cancelling by $(a-b)=\frac{x+c}{(x-a)(x-b)}$.

2. (1) $a^2(b^4-b^2c^2)=a^2b^2(b^2-c^2)=a[a^2b^2](b+c)(b-c)$.
(2) $b^2(ab+ac)^2=a^2b^2(b+c)^2=b(a^2b^2)(b+c)(b+c)$;
and therefore the G. C. M. $=a^2b^2(b+c)$, or $a^2b^2+a^2b^2c$.

3. (1) Multiplying by ·5, we get

$$7{\cdot}1-3x=4x+4{\cdot}72.$$

By transposing, $7{\cdot}1-4{\cdot}72=3{\cdot}4x+2{\cdot}38=3{\cdot}4x,$

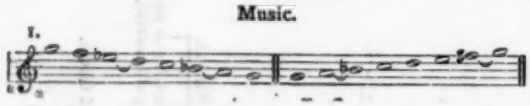
$$x=7.$$

(2) Reducing to common denominators, we get

$$288+2=29x,$$

$$x=10.$$

Music.

1.

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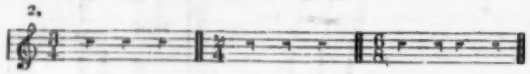

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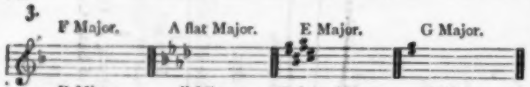


FOURTH YEAR.

Pupil Teachers at end of Fourth Year, *if apprenticed on, or after,* **1st *May* 1878; and Pupil Teachers at end of Fifth Year, if apprenticed before that date.**

FIRST PAPER.

Three hours and a half allowed.

Arithmetic.

MALES.

1. 3 persons rent a piece of land for £60, 10s. The first puts in 5 sheep for 4½ months, the second 8 sheep for 5 months, the third 9 sheep for 6½ months; what share should each pay of the rent?

2. Compare the incomes to be derived from investing £3500 in the 3½ per cents. at 98, and £3995 in the same stock at 99⅞.

3. If teas at 2s. 9d., 3s. 3d., 2s. 4d. respectively be mixed in equal quantities, and the mixture be sold at 16 guineas per cwt., what will be the gain or loss per cent.?

4. What percentage on £1,000,000,000 is $\sqrt{112}\times\sqrt{175}$?

5. Find two decimal fractions together equal to $\frac{1}{18}$, and such that one shall be $\frac{1}{5}$ of the other.

FEMALES.

1. What sum of money will amount to £256, 10s. in 4 years at 3½ per cent. simple interest?

2. If a man can travel 198 miles by railway for £2, 9s. 6d., how far at the same rate of charge ought he to be carried for £8, 0s. 10½d.?

3. The price of a work which comes out in parts is £2, 16s. 8d., but if the price of each part were 13d. more than it is, the price of the work would be £3, 7s. 6d. How many parts are there?

4. Divide £11,000 among 4 persons, A, B, C, D, in the proportions of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$.

Grammar.

1. 'And to a pleasant grove I 'gan to pass
Long *ere* the brighte sun *uprisen* was;
In which were oakes great, straight *as* a line,
Under the which the grass, so fresh of hue,
Was newly *sprung; and an eight foot or nine*
Every tree well from his fellow grew,
With branches broad, laden with leavës new,
That sprangen out against the sunnë sheen;
Some very red; and some a glad light green;
Which, as *me thought*, was a right pleasant sight.'

CHAUCER, *The Flower and the Leaf.*

(*a*) Notice any points in which the English of the above passage differs from modern English.

(*b*) How many sentences are there in it, and by what means are they connected?

(*c*) Name the particular kind of sentence to which each belongs.

(*d*) Parse the words in italics.

2. Give the origin (old English derivation) of the following words:—*ought, must, durst;* and of *better, worst, least, cunning.*

Geography.

1. Give notes of a lesson on 'Central America,' and illustrate it by a map.

2. Describe fully the Indian Ocean, with the seas, gulfs, and bays connected with it, its chief currents and periodical winds.

SECOND PAPER.

One hour allowed for Females, two hours and a half for Males.

History.

1. What families have occupied the throne of England since 1066, and from what countries did they severally spring?

2. Mention the chief foreign possessions of the British Crown, and tell when they were severally acquired.

3. Give some account of the chief manufactures of England. Tell in what parts of the kingdom they are now carried on, and point out any changes which have taken place in this respect.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Versatility.*

Write, in small hand, as a specimen of copy-setting, '*Stirred up by Dorset, Buckingham, and Morton, he comes.*'

Composition.

Write an essay on *The difference between Trades and Professions.*

Euclid.

(The only abbreviation allowed for '*the square on AB*' is '*sq. on AB*,' and for '*the rectangle contained by AB and CD*,' '*rect. AB, CD.*')

1. Upon the same base, and on the same side of it, there cannot be two triangles that have their sides which are terminated in one extremity of the base, equal to one another, and likewise those which are terminated in the other extremity.

2. If a straight line be divided into two equal parts, and also into two unequal parts; the rectangle contained by the unequal parts, together with the square on the line between the points of section, is equal to the square on half the line.

3. If from the right angle of a right-angled triangle lines be drawn to the opposite angles of the square described on the hypotenuse, the difference of the squares on these lines is equal to the difference of the squares on the two sides of the triangle. [Use II. 12.]

Algebra.

1. Reduce to the lowest terms $\dfrac{9x^3+6x^2-2x-4}{12x^3-5x^2+4x-4}$.

2. An express train leaves London for Manchester (188 miles) at 9 A.M., travelling 40 miles an hour; a slow train leaves Manchester for London at 11 A.M., travelling 20 miles an hour; when will they meet?

3. Solve the equations:—

$$(1)\ \begin{cases} 7x-16y=42. \\ 5x+17y=30. \end{cases}$$

$$(2)\ -\frac{1}{1-x^2}-\frac{7}{8}=\frac{1}{1-x}-\frac{1}{1+x}.$$

Mensuration.

1. Find the length of a circular arc whose radius is 20 ft. 9 in., and which contains an angle of 15° 9′.

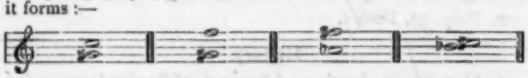
2. The sides of a triangle are 13 ft., 15 ft., 18 ft.; find the two parts into which the greatest side is divided by the perpendicular from the opposite angle.

Music.

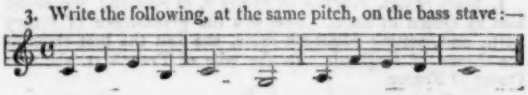
A quarter of an hour allowed for this paper.

1. Write the upper tetrachord of E (*Mi*) minor in every form with which you are acquainted. Mark the places of the semitones, and augmented intervals.

2. Write under each of the following pairs of notes the name and quality (major, perfect, diminished, or other) of the interval it forms:—



3. Write the following, at the same pitch, on the bass stave:—



ANSWERS.—FOURTH YEAR.

Arithmetic.

MALES.

1. 5 sheep for 4½ months = 1 sheep for 22½ months.
8 ,, 5 ,, = 1 ,, 40 ,,
9 ,, 6½ ,, = 1 ,, 58½ ,,
Total, 121 months.
The proportions are therefore
121 months : 22½ :: £60, 10s. : £11, 5s. Ans.
121 ,, : 40 :: £60, 10s. : £20, 0s. Ans.
121 ,, : 58½ :: £60, 10s. : £29, 5s. Ans.

2. £98 : £3500 :: £3½ : £125 = first income.
£99½ : £3995 :: £3½ : £140 = second income.

3.

	s.	d.
1st ten costs	2	9
2d ,,	3	3
3d ,,	2	4
	8	4

therefore the 3 lbs. cost 8 4 when mixed,
1 lb. costs 2 9⅓ on an average.
112 lbs. sell at £16, 16s., or 1 lb. sells at 3s.
There is therefore a gain of 2⅔d. per lb.
2s. 9⅓d. : 2⅔ :: £100 : 8 p. c. gain.

4. $\sqrt{112 \times 175} = \sqrt{19600} = 140$,

$\sqrt{1{,}000{,}000{,}000} = 1000$.
The question is, If 1000 gain 140, what will 100 gain?
1000 : 140 : 100 :: 14. Ans.

5. There are 15 parts in the one number,
and 1 part in the other,
—
or 16 parts in both.
Therefore 16 : 15 :: $\frac{1}{15}$: $\frac{1}{16}$ = ·0625. Ans.
16 : 1 :: $\frac{1}{15}$: $\frac{1}{240}$ = ·00416. Ans.

FEMALES.

1. £100 amounts to £114 in given time and at given rate;
therefore £114 : £100 :: £256, 10s. : £225. Ans.

2. £2, 9s. 6d. : £8, 0s. 10½d. :: 198 miles.
$\frac{3861 \times 198}{1188} = 643\frac{1}{2}$ miles. Ans.

3. Price of work = £2 16 8
13d. more on each part would make the price = £3 7 6
Difference on whole = £0 10 10
∴ number of parts × 13 = 130d.,
130 ÷ 13 = 10. Ans.

4. A's proportion = ⅓, or 30 sixtieths,
B's ,, = ⅓ ,, 20 ,,
C's ,, = ¼ ,, 15 ,,
D's ,, = ⅕ ,, 12 ,,
77 ,,

	£	£	s.	d.	
77 : 30 ::	11,000 :	4285	14	3⅓	A's.
77 : 20 ::	11,000 :	2857	2	10⅔	B's.
77 : 15 ::	11,000 :	2142	17	1½	C's.
77 : 12 ::	11,000 :	1714	5	8⅔	D's.

Grammar.

1. (*a*) In the given lines the following may be noted as different from modern English :—

'gan; *-ē* in *brightē*; *up* joined to *risen*; *ēs* in *oakēs*; *the* joined to *which*; *an eight foot or nine*; accent on second syllable of *every*; *well from his fellow*; *his* = *its*; *-ēs* in *branchēs* and *leavēs*; *-en* accented in *laden*; *-en* in *sprangen*; *-ē* in *sunnē*; accent on *a*.

(*b*) and (*c*) may be answered together, thus :—
(1) 'And to a pleasant a grove I 'gan to pass.' *A principal sent.*
(2) 'Long ere the brightē sun uprisen was.' *Subord. adv. sent.* modifying (1), connected by *long ere.*
(3) 'In which were oakēs great (*and*) straight.' *Adj. sent.* qual. *grove*, connected by *in which.*
(4) 'As a line (*is straight*).' *Adv. sent.* subord. to (3), connected by *as.*
(5) 'Under the which the grass so fresh of hue was newly sprung.' *Adj. sent.* subord. to (3), qual. *oakēs*, connected by *under the which.*
(6) 'And (at) an eight foot or nine, every tree well from his fellow grew, with branchēs broad, laden with leavēs new.' *A subord. sent.* connected with the former by *and.*
(7) 'That sprangen out against the sunnē sheen.' *Adj. sent.* subord. to (6), qual. *leavēs*, connected by *that.*
(8) 'Some (*were*) very red.' *Principal sent.*, connected by *and* with foregoing sent.
(9) 'And some (*were*) a glad light green.' *Principal sent.*, connected with (8) by *and.*
(10) 'Which was a right pleasant sight.' *Equal to a principal sent.*, co-ord. with former sentences by *and.*
(11) 'As me thought.' *Interjectional.*

(*d*) PARSING.

ere—conjunctive adv., introducing subord. sent.
uprisen—complete part. of irreg. verb *uprise, uprose, uprisen*, qual. *sun.*
sprung—complete part. of irreg. verb *spring, sprang, sprung*, qual. *grass.*
and—co-ordinating copul. conj.
an—art. indef. or adj. qual. the idiomatic expression *eight foot or nine*, equal to *at a distance of eight or nine feet.*
every—distrib. adj. qual. *tree.*
tree—com. noun, neut. sing. nom. subj. of *grew.*
well—adv. mod. the phrase *from his fellow.*
from—prep. gov. *fellow.*
his—pronom. adj. poss. qual. *fellow* (= *its*).
fellow—com. noun, neut. sing. obj. by *from.*
grew—intrans. verb irreg. *grow, grew, grown*, indicative mood, past tense, 3d pers. sing. agr. with *tree.*
me thought—a species of impers. verb equal to *it seemed to me.*

2.
ought, though now used as a present, is really the past tense of the verb 'owe' in its old sense of 'have,' 'possess.'
must—derived from *moste*, past of O.E. pres. *mot.*
durst—is a present as well as a past derived from (*dearan*), *dyrst.*
better—from O.E. *betera* (from *betan*, to grow well).
worst—from *wyrst* (*weor*, a lost positive).
least—from *læst.*
cunning—from *cunnan*, to know or be able.

Geography.

1. NOTES OF A LESSON ON CENTRAL AMERICA.

Description and Situation.—Central America consists of a long, narrow, and irregular strip stretching from Mexico to the narrowest part of the Isthmus of Panama.

Size.—About 900 miles long, and from 70 to 350 miles broad.

Physical Features.—The mountains of three groups—the Honduras and Nicaragua group, the Costa Rica group, and the Guatemala group; some volcanoes in latter. Centre of country a lofty table-land, with a temperate climate; the coast low, hot, and unhealthy. Rivers of little consequence. The soil is very fertile.

Products.—Indigo, cochineal, mahogany, dye-woods, sugar, and cotton.

The chief industries are agriculture, mining, and cutting mahogany and other woods for exportation.

Divisions.—Guatemala, San Salvador, Honduras, Nicaragua, and Mosquito Coast, Costa Rica, and British Honduras. *Towns.*—New Guatemala, San Salvador, Leon, San José, and Balize.

Population.—Nearly three millions, consisting of Indians, Spaniards, and a mixed race.

Government.—Except in British Honduras—a British colony—the form of Government is republican, each of the five states being independent.

Religion.—Roman Catholic; other Churches tolerated.

Map should be drawn on blackboard.

2. The Indian Ocean, south of Asia, extends from Africa to Australasia, length 4500 miles, breadth 4500 miles. It is cleft

3. (1) Multiplying by ·5, we get

$$7{\cdot}1 - 3x - {\cdot}4x = 4{\cdot}72.$$

By transposing, $7{\cdot}1 - 4{\cdot}72 = 3{\cdot}4x$,

$$2{\cdot}38 = 3{\cdot}4x,$$

$$x = {\cdot}7.$$

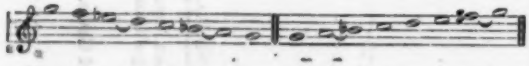
(2) Reducing to common denominators, we get

$$288 + 2 = 29x,$$

$$x = 10.$$

Music.

1.



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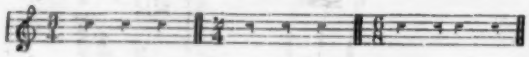

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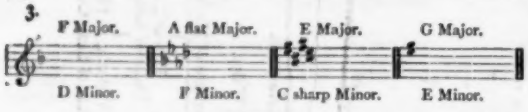
FOURTH YEAR.

Pupil Teachers at end of Fourth Year, *if apprenticed on, or after,* **1st *May* 1878; and Pupil Teachers at end of Fifth Year, if apprenticed before that date.**

FIRST PAPER.

Three hours and a half allowed.

Arithmetic.

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2. Compare the incomes to be derived from investing £3500 in the 3½ per cents. at 98, and £3995 in the same stock at 99⅞.

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2. If a man can travel 198 miles by railway for £2, 9s. 6d., how far at the same rate of charge ought he to be carried for £8, 0s. 10½d.?

3. The price of a work which comes out in parts is £2, 16s. 8d., but if the price of each part were 13d. more than it is, the price of the work would be £3, 7s. 6d. How many parts are there?

4. Divide £11,000 among 4 persons, A, B, C, D, in the proportions of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$.

Grammar.

1. 'And to a pleasant grove I 'gan to pass
Long *ere* the brighte sun *upriseñ* was;
In which were oakës great, straight *as* a line,
Under the which the grass, so fresh of hue,
Was newly *sprung; and an eight foot or nine*
Every tree well from his fellow grew,
With branchës broad, laden with leavës new,
That sprangen out against the sunnë sheen;
Some very red; and some a glad light green;
Which, as *me thought*, was a right pleasant sight.'

CHAUCER, *The Flower and the Leaf.*

(*a*) Notice any points in which the English of the above passage differs from modern English.

(*b*) How many sentences are there in it, and by what means are they connected?

(*c*) Name the particular kind of sentence to which each belongs.

(*d*) Parse the words in italics.

2. Give the origin (old English derivation) of the following words:—*ought, must, durst;* and of *better, worst, least, cunning.*

Geography.

1. Give notes of a lesson on 'Central America,' and illustrate it by a map.

2. Describe fully the Indian Ocean, with the seas, gulfs, and bays connected with it, its chief currents and periodical winds.

SECOND PAPER.

One hour allowed for Females, two hours and a half for Males.

History.

1. What families have occupied the throne of England since 1066, and from what countries did they severally spring?

2. Mention the chief foreign possessions of the British Crown, and tell when they were severally acquired.

3. Give some account of the chief manufactures of England. Tell in what parts of the kingdom they are now carried on, and point out any changes which have taken place in this respect.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Versatility.*

Write, in small hand, as a specimen of copy-setting, '*Stirred up by Dorset, Buckingham, and Morton, he comes.*'

Composition.

Write an essay on *The difference between Trades and Professions.*

Euclid.

(The only abbreviation allowed for '*the square on AB*' is '*sq. on AB*,' and for '*the rectangle contained by AB and CD*,' '*rect. AB, CD.*')

1. Upon the same base, and on the same side of it, there cannot be two triangles that have their sides which are terminated in one extremity of the base, equal to one another, and likewise those which are terminated in the other extremity.

2. If a straight line be divided into two equal parts, and also into two unequal parts; the rectangle contained by the unequal parts, together with the square on the line between the points of section, is equal to the square on half the line.

3. If from the right angle of a right-angled triangle lines be drawn to the opposite angles of the square described on the hypotenuse, the difference of the squares on these lines is equal to the difference of the squares on the two sides of the triangle. [Use II. 12.]

Algebra.

1. Reduce to the lowest terms $\dfrac{9x^3+6x^2-2x-4}{12x^3-5x^2+4x-4}$.

2. An express train leaves London for Manchester (188 miles) at 9 A.M., travelling 40 miles an hour; a slow train leaves Manchester for London at 11 A.M., travelling 20 miles an hour; when will they meet?

3. Solve the equations:—

$$(1)\ \begin{cases} 7x - 16y = 42. \\ 5x + 17y = 30. \end{cases}$$

$$(2)\ -\frac{1}{1-x^2} - \frac{7}{8} = \frac{1}{1-x} - \frac{1}{1+x}.$$

Mensuration.

1. Find the length of a circular arc whose radius is 20 ft. 9 in., and which contains an angle of 15° 9′.

2. The sides of a triangle are 13 ft., 15 ft., 18 ft.; find the two parts into which the greatest side is divided by the perpendicular from the opposite angle.

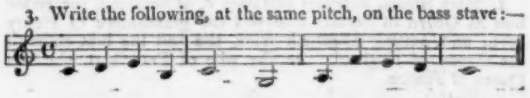
Music.

A quarter of an hour allowed for this paper.

1. Write the upper tetrachord of E (*Mi*) minor in every form with which you are acquainted. Mark the places of the semitones, and augmented intervals.

2. Write under each of the following pairs of notes the name and quality (major, perfect, diminished, or other) of the interval it forms:—

3. Write the following, at the same pitch, on the bass stave:—



ANSWERS.—FOURTH YEAR.

Arithmetic.

MALES.

1. 5 sheep for 4½ months = 1 sheep for 22½ months.
8 „ 5 „ = 1 „ 40 „
9 „ 6½ „ = 1 „ 58½ „
Total, 121 months.

The proportions are therefore
121 months : 22½ :: £60, 10s. : £11, 5s. Ans.
121 „ : 40 :: £60, 10s. : £20, 0s. Ans.
121 „ : 58½ :: £60, 10s. : £29, 5s. Ans.

2. £98 : £3500 :: £3½ : £125 = first income.
£99½ : £3995 :: £3½ : £140 = second income.

3.

	s.	d.
1st tea costs	2	9
2d „	3	3
3d „	2	4
therefore the 3 lbs. cost	8	4 when mixed,
1 lb. costs	2	9⅓ on an average.

112 lbs. sell at £16, 16s., or 1 lb. sells at 3s.
There is therefore a gain of 2⅔d. per lb.
2s. 9⅓d. : 2⅔ :: £100 : 8 p. c. gain.

4. $\sqrt{112 \times 175} = \sqrt{19600} = 140$,

$\sqrt[3]{1,000,000,000} = 1000$.
The question is, If 1000 gain 140, what will 100 gain?
1000 : 140 : 100 :: 14. Ans.

5. There are 15 parts in the one number,
and 1 part in the other,
—
or 16 parts in both.
Therefore 16 : 15 :: $\frac{1}{15}$: $\frac{1}{16}$ = ·0625. Ans.
16 : 1 :: $\frac{1}{15}$: $\frac{1}{240}$ = ·00416. Ans.

FEMALES.

1. £100 amounts to £114 in given time and at given rate;
therefore £114 : £100 :: £256, 10s. : £225. Ans.

2. £2, 9s. 6d. : £8, 0s. 10½d. :: 198 miles.
$\frac{3861 \times 198}{1188} = 643\frac{1}{2}$ miles. Ans.

3. Price of work = £2 16 8
13d. more on each part would make the price = £3 7 6
Difference on whole = £0 10 10
∴ number of parts × 13 = 130d.,
130 ÷ 13 = 10. Ans.

4. A's proportion = ½, or 30 sixtieths,
B's „ = ⅓ „ 20 „
C's „ = ¼ „ 15 „
D's „ = ⅕ „ 12 „
77 „

	£	s.	d.	
77 : 30 :: 11,000 :	4285	14	3½	A's.
77 : 20 :: 11,000 :	2857	2	10½	B's.
77 : 15 :: 11,000 :	2142	17	1½	C's.
77 : 12 :: 11,000 :	1714	5	8½	D's.

Grammar.

1. (*a*) In the given lines the following may be noted as different from modern English:—

'gan; *-ë* in *brightë*; *up* joined to *risen*; *ës* in *oakës*; *the* joined to *which*; *an eight foot or nine*; accent on second syllable of *every*; *well from his fellow*; *his* = *its*; *-ës* in *branchës* and *leavës*; *-en* accented in *laden*; *-en* in *sprangen*; *-ë* in *sunnë*; accent on *a*.

(*b*) and (*c*) may be answered together, thus:—
(1) 'And to a pleasant a grove I'gan to pass.' *A principal sent.*
(2) 'Long ere the brightë sun uprisen was.' *Subord. adv. sent.* modifying (1), connected by *long ere.*
(3) 'In which were oakës great (*an I*) straight.' *Adj. sent.* qual. *grove*, connected by *in which.*
(4) 'As a line (*is straight*).' *Adv. sent.* subord. to (3), connected by *as.*
(5) 'Under the which the grass so fresh of hue was newly sprung.' *Adj. sent.* subord. to (3), qual. *oakes*, connected by *under the which.*
(6) 'And (at) an eight foot or nine, every tree well from his fellow grew, with branchës broad, laden with leavës new.' *A subord. sent.* connected with the former by *and.*
(7) 'That sprangen out against the sunnë sheen.' *Adj. sent.* subord. to (6), qual. *leavës*, connected by *that.*
(8) 'Some (*were*) very red.' *Principal sent.*, connected by *and* with foregoing sent.
(9) 'And some (*were*) a glad light green.' *Principal sent.*, connected with (8) by *and.*
(10) 'Which was a right pleasant sight.' *Equal to a principal sent.*, co-ord. with former sentences by *and.*
(11) 'As me thought.' *Interjectional.*

(*d*) PARSING.

ere—conjunctive adv., introducing subord. sent.
uprisen—complete part. of irreg. verb *uprise, uprose, uprisen*, qual. *sun.*
sprung—complete part. of irreg. verb *spring, sprang, sprung*, qual. *grass.*
and—co-ordinating copul. conj.
an—art. indef. or adj. qual. the idiomatic expression *eight foot or nine*, equal to *at a distance of eight or nine feet.*
every—distrib. adj. qual. *tree.*
tree—com. noun, neut. sing. nom. subj. of *grew.*
well—adv. mod. the phrase *from his fellow.*
from—prep. gov. *fellow.*
his—pronom. adj. poss. qual. *fellow* (= *its*).
fellow—com. noun, neut. sing. obj. by *from.*
grew—intrans. verb irreg. *grow, grew, grown*, indicative mood, past tense, 3d pers. sing. agr. with *tree.*
me thought—a species of impers. verb equal to *it seemed to me.*

2.
ought, though now used as a present, is really the past tense of the verb 'owe' in its old sense of 'have,' 'possess.'
must—derived from *moste*, past of O.E. pres. *mot.*
durst—is a present as well as a past derived from (*dearan*), *dyrst.*
better—from O.E. *betera* (from *betan*, to grow well).
worst—from *wyrst* (*wcor*, a lost positive).
least—from *læst.*
cunning—from *cunnan*, to know or be able.

Geography.

1. NOTES OF A LESSON ON CENTRAL AMERICA.

Description and Situation.—Central America consists of a long, narrow, and irregular strip stretching from Mexico to the narrowest part of the Isthmus of Panama.

Size.—About 900 miles long, and from 70 to 350 miles broad.

Physical Features.—The mountains of three groups—the Honduras and Nicaragua group, the Costa Rica group, and the Guatemala group; some volcanoes in latter. Centre of country a lofty table-land, with a temperate climate; the coast low, hot, and unhealthy. Rivers of little consequence. The soil is very fertile.

Products.—Indigo, cochineal, mahogany, dye-woods, sugar, and cotton.

The chief industries are agriculture, mining, and cutting mahogany and other woods for exportation.

Divisions.—Guatemala, San Salvador, Honduras, Nicaragua, and Mosquito Coast, Costa Rica, and British Honduras. *Towns.*—New Guatemala, San Salvador, Leon, San José, and Balize.

Population.—Nearly three millions, consisting of Indians, Spaniards, and a mixed race.

Government.—Except in British Honduras—a British colony—the form of Government is republican, each of the five states being independent.

Religion.—Roman Catholic; other Churches tolerated.

Map should be drawn on blackboard.

2. The Indian Ocean, south of Asia, extends from Africa to Australasia, length 4500 miles, breadth 4500 miles. It is cleft

into two parts by India, which parts are called the Arabian Sea and the Bay of Bengal. With the former are connected the Red Sea, Gulf of Aden, Persian Gulf, Gulf of Oman, Gulf of Cutch, and Gulf of Cambay; with the latter, Gulf of Manaar and Gulf of Martaban. Its basin is very important, being the whole of India and Burmah, including the great rivers Indus, Ganges, Brahmapootra, and Irrawady, as well as the Tigris, Euphrates, and the Zambesi. It contains coral reefs and islands. Its most striking feature lies in its periodical winds, called *monsoons*, which are as useful as trade-winds, and have a great effect on the climate of India. They blow from east to west from November to March, but from April to October from south-west. The Indian Ocean is also exposed to tornadoes and to cyclone waves. The main current starts from the Bay of Bengal, sweeps past Ceylon and the Seychelles Islands, and between Africa and Madagascar to the Cape of Good Hope. There it is suddenly checked, and turned to the south-west.

3. The great manufactures of England are those of woven and felted materials, and metals or hardware; and of these cotton, wool, and iron are by far the most important. Next in importance are the manufacture of leather, silk, linen, glass, and earthenware. The various manufactures of beer, spirits, soap, etc., employ a great number of persons.

Cotton manufacture has its chief seat in Lancashire, Cheshire, and the neighbouring counties. Manchester is the centre.

Woollen manufacture has its chief seat in the West Riding of Yorkshire, with Leeds as centre. Broadcloths are made in Gloucester and Wilts. *Carpets* are made in Yorkshire, and at Kidderminster. *Flannels* are manufactured in Wales, chiefly in Montgomeryshire.

Silk manufacture is carried on in London, and also in Cheshire and Lancashire.

Linen is not very important, but the town of Barnsley, in the West Riding, is its chief seat.

The *iron and hardware manufacture* has its chief seat in the south part of Staffordshire, in Shropshire, Derbyshire, and the West Riding of York.

The *leather manufacture* has its chief seat in the counties of Northampton and Stafford, and in London.

Earthenware is made in the north of Stafford, in the district called the 'Potteries.'

Silk used only to be made at Spitalfields. *Woollen* used to be manufactured only at Worsted in Norfolk.

History.

1. The families that have occupied the throne of England from 1066 are :—

(1) Norman	line from	France.
(2) Plantagenet	,,	Anjou in France.
(3) Lancastrian	,,	England.
(4) Yorkist	,,	,,
(5) Tudor	,,	,,
(6) Stuart	,,	Scotland.
(7) Orange	,,	Holland
(8) Hanover	,,	Germany.

2. The chief foreign possessions of the British crown are :—

N. America—

Canada,	acquired	1759-60.
Nova Scotia,	,,	1760.
New Brunswick,	,,	1784.
Brit. Columbia,	,,	1758.
Newfoundland,	,,	1608.

Australia—

New S. Wales,	,,	1788.
Victoria,	,,	1836.
S. Australia,	,,	,,
W. Australia,	,,	,,
Queensland,	,,	1859.
New Zealand,	,,	1839.

S. Africa—

Cape of Good Hope,	,,	1806.
Natal,	,,	1824.
Mauritius,	,,	1810.
West Coast Settlements,	,,	1631-73.

Asia—

India,	acquired	1757.
Ceylon,	,,	1796.

West Indies and S. America—

Jamaica,	,,	1655.
Bahamas,	,,	1629.
Barbadoes,	,,	1625.
Trinidad,	,,	1787.
Brit. Guiana,	,,	1814.
Honduras,	,,	1670.

Europe—

Gibraltar,	,,	1704.
Malta,	,,	1800.
Cyprus,	,,	1878.

Composition.

THE DIFFERENCE BETWEEN TRADES AND PROFESSIONS.

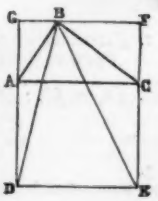
In defining the difference between a trade and a profession, it may be stated that the former is a handicraft occupation, and the latter an occupation depending chiefly on study and learning. The professions are acquired by long and laborious application at schools and universities, under professors specially eminent for their knowledge of certain branches of learning; while a trade may be acquired in a workshop or some technical school, under practical masters who have gained their skill by experience in a special line of business. In the case of a trade a certificate of competency is very valuable, and sometimes necessary; but to follow out a profession a diploma of a high order is absolutely required. The different kinds of trades are almost innumerable, and fall under the general term *skilled labour*. But professions are comparatively few on account of the time, labour, and money needed for mastering them; they are almost all comprised under these heads, the *medical*, *legal*, and *clerical professions*, which are sometimes called briefly the *learned professions*.

Euclid.

1. Prop. 7, Book I.

2. Prop. 5, Book II.

3. Let ADEC be a square described on the hypotenuse of the triangle ABC, having B a right angle, and join BD, BE. Then the difference between the squares on BD, DE shall be equal to the difference between the squares on BA, BC.



Through B draw GBF parallel to AC, and meeting DA, EF produced in G and F. Then BG, BF are perpendiculars let fall from B on the bases DA, EC produced, and therefore (by II. 12),

The square on BE = square on EC, square on CB and twice rectangle EC, CF.

But EC = AD and AG = CF, being opposite sides of parallelograms; and therefore by substitution, square on BE = square on DA, square on CB, and twice rectangle DA, AG.

Now square on BD = square on DA, square on AB, and twice rectangle DA, AG; therefore the difference of square on BE and square on BD is equal to the difference of square on CB and square on AB.

Algebra.

1. Dividing by G. C. M. $3x-2$,

$$\text{the lowest terms} = \frac{3x^2+4x+2}{4x^2+x+2}.$$

2. Let x = time in hours.

But by the time second train starts, the first is 80 miles on the way; therefore the equation is

$$40x+20x = 108,$$
$$60x = 108,$$
$$x = 1 \text{ hour } 48 \text{ minutes};$$

that is, they meet 1 hour 48 minutes after 11, or 12 minutes to 1.

3. (1) $7x-16y=42$, or $35x-80y=210$
$5x+17y=30$, or $35x+119y=210$

By subtracting, $-199y=0$
$y=0$ Ans.

Therefore, by substituting 0 for y,
$35x-0=210$,
$x=6$. Ans.

(2) Multiplying both sides of equation by $8(1-x)^2$, and taking care to change signs when the fractions have the negative sign, we obtain

$$-8-7+7x^2=8+8x-8+8x.$$

Transposing,

$$7x^2-8x-8x=8-8+8+7.$$

Collecting,

$$7x^2-16x=15,$$

$$\text{or } x^2-\frac{16}{7}x=\frac{15}{7}.$$

Completing square,

$$x^2-\frac{16}{7}x+\frac{64}{49}=\frac{105}{49}+\frac{64}{49}=\frac{169}{49}.$$

Taking root,

$$x-\frac{8}{7}=\pm\frac{13}{7},$$

$$x=\frac{8}{7}\pm\frac{13}{7},$$

$$x=3, \text{ or } -\frac{5}{7}. \text{ Ans.}$$

Mensuration.

1. Circumference of circle $=249$ in. $\times 2\times\frac{22}{7}=1565$ in.;

therefore $360^\circ : 15^\circ\ 9' :: 13$ ft. 5 in.
or $21600' : 909' :: 1565$ in.

$$\frac{909\times 1565}{21600}=65{\cdot}86 \text{ in.}=5{\cdot}488 \text{ ft. Ans.}$$

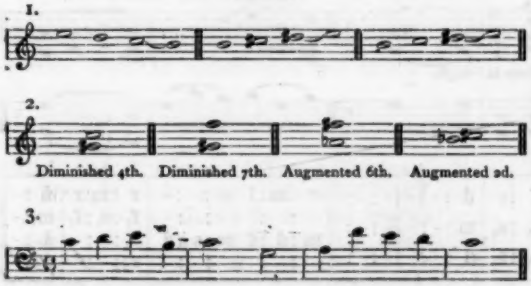
2. This is readily solved by Euclid II. 13.

Let abc be the triangle with sides as given. From a let fall perpendicular ad, and let x=distance bd. Then square on $ac+2$ rect. $cb\,.\,bd$=square on cb+square on ba.

Or $15^2+2\times 18\times x=18^2+13^2$,
$225+36x=324+169$,
$36x=268$,
$x=7\frac{4}{9}$;

therefore one part $=7\frac{4}{9}$ ft., and the other $=10\frac{5}{9}$ ft.

Music.



Publications Received.

Algebra—
(1) Algebraic Difficulties Simplified. Stewart.

Arithmetic—
(1) Sonnenschein & Nesbitt's Arithmetic. Sonnenschein & Allen.
(2) Sonnenschein & Nesbitt's ABC of Arithmetic. Sonnenschein & Allen.
(3) Class-Book of Mental Arithmetic. Walker & Co.
(4) Oxford and Cambridge Examination Papers. Stewart.

Botany—
(1) Text-Book of Botany. Sonnenschein & Allen.
(2) Botanical Schedules. Sonnenschein & Allen.
(3) Plants, etc., by C. Baker. Systematic Bible Teachers' Depot.

Drawing—
(1) Brown's Freehand Drawing Copies. Walker & Co.
(2) Lewis's Perspective Drawing Books. Walker & Co.

French—
(1) De Fivas' Guide. Lockwood & Co.
(2) Antoine's French Verb Book. Hughes.

Geography—
(1) Geographical Reader. Standard II. Stewart.
(2) Royal Relief Atlas. Sonnenschein & Allen.
(3) Industrial Geographical Primers: Great Britain and Ireland, France, United States. Sonnenschein & Allen.
(4) Maps illustrative of Cæsar's Gallic War. Sonnenschein & Allen.
(5) Elementary Atlas. Walker & Co.
(6) Slate Paper Projection Atlas. Walker & Co.
(7) Slate Paper Outline Atlas. Walker & Co.
(8) Maps illustrative of Cæsar's 'De Bello Gallico.' With Handbook. W. & A. K. Johnston.

History—
(1) Young Pupil's Historical Remembrancer. John Heywood.
(2) Mangnall's Historical Questions. Hodder & Stoughton.

Kindergarten—
(1) Number Pictures for Nursery Kindergarten. Sonnenschein & Allen.
(2) Child and Child Nature. Sonnenschein & Allen.
(3) On the Connection between Kindergarten and School. Sonnenschein and Allen.
(4) Physical Education of Girls. Sonnenschein & Allen.
(5) The Use of Stories in Kindergarten. Sonnenschein & Allen.
(6) Wasted Forces. Sonnenschein & Allen.
(7) Mutter und Kose Lieder. Sonnenschein & Allen.
(8) Froebel's System of Education. Sonnenschein & Allen.

Mental and Moral Science—
(1) Rylands' Psychology and Ethics. Sonnenschein & Allen.
(2) Elementary Notions of Logic. Sonnenschein & Allen.

Natural History—
(1) Animals: Their Nature and Use. By C. Baker. Systematic Bible Teachers' Depot.

Physiology—
(1) Man: His Frame and Wants. By C. Baker. Systematic Bible Teachers' Depot.

Political Economy—
(1) Social and National Life. By C. Baker. Systematic Bible Teachers' Depot.

School Management—
(1) Lectures on Teaching. By J. G. Zitch, M.A. Cambridge Warehouse.
(2) The Teachers' Handbook. By C. Baker. Systematic Bible Teachers' Depot.

Spelling—
(1) Spelling and Dictation Manual. Walker & Co.

BEAUTIFUL SPRING.

Words by GEORGE BENNETT.
Music by T. CRAMPTON.

Cheerfully. *mf*

1ST TREBLE.
2D TREBLE.
BASS.

1. We're off to the wood-lands a - way, To give the first wel-come to spring; Our
2. The prim-rose is star - ring the meads, And vio - lets are scent-ing the breeze; The
3. Then come now, and join the glad lays That her - ald the com-ing of spring; Come

KEY G. *mf*

1ST TREBLE.	:s	s	:m	:l	s	:m	:l	s	:-	:-	:-	:-	:s	s	:f	:m	r	:m	:f
2D TREBLE.	:m	m	:d	:f	m	:d	:f	m	:-	:-	:-	:-	:m	m	:r	:d	t_1	:d	:r
BASS.	:d	d	:d	:d	d	:d	:d	d	:-	:-	:-	:-	:d	s_1	$:s_1$	$:s_1$	s_1	$:s_1$	$:s_1$

	m	:-	:-	:-	r	:-	:-	:-	m	:-	:-	:-	r	:-	:-	:-	d	:-	:-	:-
	d	:-	:-	:-	d	:-	:-	:-	d	:-	:-	:-	d	:-	:-	:-	t_1	:-	:-	:-
	d	:-	:-	:-	d	:-	:-	:-	d	:-	:-	:-	s_1	:-	:-	:-	s_1	:-	:-	:-

song shall be jo - cund and gay, And through the blue wel - kin shall ring. The
bright dew-drops spark-le like beads A - round all the fresh bud-ding trees. The
wel - come the first hap - py days That sun - shine and me - lo - dy bring. We're

D. t.

	s	:d'	:d'	d'	:t	:d'	l	:-	:-	:-	:-	:l	s	:m	:d'	t	:r'	:t	d'	:-	:-	:-	:-	d'
	m	:m	:m	m	:f	:s	f	:-	:-	:-	:-	:f	m	:d	:m	f	:f	:f	m	:-	:-	:-	:-	m
	d	:d	:d	d	:r	:m	f	:-	:-	:-	:-	:f	s	:s	:s	s_1	$:s_1$	$:s_1$	d	:-	:-	:-	:-	d

sun has shone out once a - gain, The lark sweet-ly car - ols on high; So we'll
thrush has a mad - ri - gal new, The black-bird a sol - o will try; And we'll
young and as blithe as the birds, With them a gay lyr - ic we'll try; And we'll

f. G.

	s	:r	:r	r	:m	:f	m	:-	:-	:-	:s	l	:s	:m	d	:r	:m	r	:-	:-	s	:-	:f
	t	:t_1	:t_1	t_1	:d	:r	d	:-	:-	:-	:d	d	:d	:s_1	fe_1	:fe_1	:fe_1	s_1	:-	:-	t_1	:-	:t_1
	s	:s_1	:s_1	s_1	:s_1	:s_1	d	:-	:-	:-	:m_1	f	:m_1	:d	l_1	:l_1	:l_1	t_1	:-	:-	s_1	:-	:s_1

sing, and we'll sing, and we'll sing, For the beau - ti - ful spring-time is nigh.

	m	:f	:s	l	:s	:f	s	:-	:-	s	:-	:s	s	:r	:r	r	:m	:f	m	:-	:-	:-	:-	
	d	:d	:d	d	:d	:d	d	:-	:-	d	:-	:d	t_1	:t_1	:t_1	t_1	:d	:r	d	:-	:-	:-	:-	
	d	:r	:m	f	:m	:r	m	:-	:-	m_1	:-	:m_1	s_1	:s_1	:s_1	s_1	:s_1	:s_1	d	:-	:-	:-	:-	

Symphony for Harmonium or Piano.

Beau-ti-ful spring! Oh, the beau-ti-ful spring-time is nigh.

Beau-ti - ful spring!

f

	:	:	:	:	:	:	f	:m	:r	m	:f	:s	l	:l	:l	s	:f	:r	d	:-	:-	:	:	:
	:	:	:	:	:	:	r	:d	:t_1	d	:d	:d	d	:d	:d	t_1	:t_1	:s_1	m_1	:-	:-	:	:	:
	s_1	:m	:d	s_1	:-	:-	:	:	:	:	:l_1	:s_1	f_1	:f_1	:f_1	s_1	:s_1	:s_1	d	:-	:-	:	:	:

	s	:m	:l	s	:-	:-	r	:m	:r	d	:-	:-							
		:	:		:	:	f_1	:s_1	:f_1	m_1	:-	:-							
	m	:d	:f	m	:s	:d	s_1	:-	:-	d	:-	:-							

Publications Reviewed.

Guide to Modern French Conversation. 224 pp. 18mo. Price 2s. 6d. By V. de Fivas, M.A., LL.D. London: Crosby Lockwood & Co.

This book richly deserves the wide popularity it enjoys. Our friends who have not seen it will thank us for having drawn their attention to this model French *vade-mecum*, and upon examining it, will, we predict, express no surprise that it has reached its twenty-ninth edition. To the tens of thousands who cross the Channel with but a smattering of French, this handy, cheap, clearly-printed, and neatly-bound tourist's companion will prove simply invaluable. We need only add that the same practised hand which wrote the *Grammaire des Grammaires* has penned the text of this useful little volume.

Exercises in Algebra, with Answers. 80 pp. 8vo. 2s. By R. Milburn, M.A. London: Stewart & Co.

Mr. Milburn has in this book collected eight years' (1870–78) questions in Algebra set at the Oxford and Cambridge Examinations. The questions are not printed in 'examinations,' as originally set by the examiners, the wiser plan of graduating the exercises and classifying them under their respective rules having been adopted. The absence of a page of 'contents' detracts from the utility of the book. Candidates will find excellent test-work in this collection of algebraical examples.

Mangnall's Questions. (New edition.) London: Hodder & Stoughton.

This is a new and admirably 'got up' edition of *Mangnall's Questions*. No teacher worthy the name, and skilled in his craft, would, however, stoop to use it. Books of this stamp reduce an otherwise interesting and ennobling study to mere dry mechanical memory-work. The paper, printing, and binding are alike excellent.

Heywood's Young Pupil's Historical Remembrancer. By J. R. Y.

No. 1. Prior to the Conquest.
No. 2. From the Norman Conquest to the Death of Richard III.
No. 3. From the Accession of Henry VII. to the Present Time.

These memory cards are made up into packets of twelve, and published at a shilling. Mr. Heywood has done his part thoroughly well; the cards are stout, well printed, and enclosed in a neat wrapper. We wish we could bestow equal praise on the compiler. On card No. 1 he has put some of the sorriest doggerel that we have ever read. This is the sort of stuff with which he would have the minds of our youth stored:—

'Egbert, the first king of all England, was brave;
But it from the Danes he had trouble to save.
Ethelwolfe was the second, and he had a son
Who wanted to take both his kingdom and crown.
Ethelbald was the third—he did that sad thing.
Ethelbert was the fourth—our first Christian king.

. . . . . .

Edmund Ironsides was the fifteenth king; he
Reigned only one year, and was murdered basely.'

We need not add another line.

The Royal Relief Atlas. Price 21s. London: Sonnenschein & Allen.

The title of this work, so far as the maps are concerned, is not a misnomer. If ever atlas deserved the title 'Royal,' this does. The embossed maps are superb, and have the additional merit of not being overcrowded with names. To form an accurate idea of their rare beauty, they must be seen. The descriptive letterpress is meagre, and we fear will injure the sale of the work. We know Mr. Bevan's space was limited, still, in describing our principal river, he could surely have said more than—'The Thames in its course of 200 miles drains the country between the Cotswold Hills and the German Ocean.' We suggest that in future editions the text be enlarged, printed in smaller type, and arranged in two columns. The value of the work as a book of reference would then be greatly enhanced. We trust that when the next prize season comes round, the *Royal Relief Atlas* will find its way into many schools.

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As we intend in a future number to notice this book at length, we shall now simply remind our readers that Mr. Fitch's admirable Cambridge lectures have been published. It would be impossible to do the author justice within the compass of a few lines. We strongly recommend *every* teacher, and all interested in practical teaching, to buy this book. A manual more helpful to those just entering the profession has not, within our recollection, been issued. No young man or woman can rise from the perusal of it without feeling not only wiser in head, but better in heart.

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Arithmetic.

STANDARD I.

(1) 679 / 540 / 19 / 704 / 900 —

(2) 859 / 294 —

(3) 3729 / 9283 —

(4) 309070408 / 6 —

STANDARD II.

(1) From 74703 Take 58097

(2) Multiply 56927 by 459 (*boys*) 37 (*girls*)

(3) 3520 / 1099 / 19078 / 20604 / 1000 —

(4) Divide 36994 by 8 (*boys*) 5 (*girls*)

(5) A man had 250 apples. He sold 6 each to 7 boys. How many left?

STANDARD III.

(1) Divide 6 millions 6 thousand and six by 72 (*girls*) 346 (*boys*)

(2) Add together 6s. 4½d.; £3002, os. 8¾d.; 9½d.; £5, 19s. 11¾d.; 17s. 0½d.; £10,764, 18s. 9½d.; £964, 17s. 8½d.

(3) Take £2, 16s. 0½d. from £1000, os. 1d.

(4) A tailor made a suit of clothes, the cost of which was for cloth, £1, 12s. 6d.; thread, 2½d.; buttons, 1s. 3¼d.; wages, 19s. 11½d. He sold the suit for 4 guineas. What profit did he make?

STANDARD IV.

(1) How many minutes in July and August?

(2) Reduce 20,000 minutes to weeks.

(3) Find cost of 13 pieces of cloth, each 60 yards, at 1s. 11½d. per yard.

(4) Reduce 7 miles 2 fur. 219 yds. 2 ft. to feet.

(5) Reduce 2½ furlongs to feet.

(6) The expenses of an entertainment amounted to 5 guineas. Find the profit, if there were sold 329 tickets at 1d. each, 250 at 3d., and 100 at 4d.

(7) 3 barrels of sugar, each 4 cwt. 3 qrs., are weighed into 1 lb. parcels. How many parcels?

(8) A clothier bought 57 overcoats at £3, 12s. 6d. each. How much did they cost him?

(9) Divide £19,993, 17s. 9¼d. by 49.

STANDARD V.

(1) A woman bakes 2 stones of flour every 4 days. How much flour would she bake in 8 weeks 2 days?

(2) Find cost of 967 articles at 1s. 7½d. each.

(3) 7 antimacassars took 6 oz. of wool each. Find cost at 5s. 8d. per lb.

(4) Calculate and receipt the following bill:—

3 stones of flour at 2½d. per lb.
16 oz. of cloves at 4s. per lb.
2 lbs. of nutmegs at 2 oz. for 1½d.
6 oz. pepper at 1s. 4d. per lb.

STANDARD VI.

(1) If 25 men do a piece of work in 24 days of 8 hours each, how many hours a day would 30 men have to work 16 days to do the same?

(2) $\frac{3\frac{1}{8}}{1\frac{3}{16}} \div \frac{6\frac{2}{3}}{2\frac{3}{8}}$.

(3) £4, 16s. 10¾d. ÷ 3·25.

(4) Find the difference between $\frac{2\frac{1}{3}}{5\frac{5}{6}}$ and $\frac{3\frac{5}{8}}{1\frac{1}{16}}$.

(5) Find the value of ¾ guinea + ⅝ crown + ⅘ of 7s. 6d. − ¾ of 2d.

(6) If 8 oz. cost ·5625 of a shilling, what will ·75 of a ton cost?

Domestic Economy.

STAGE I.

A.

1. What do you understand by food? Name the three chief offices which food performs.
2. Describe fully the roasting of a joint of meat.
3. Describe how soups are made. Do you know how broth is made for a working man and his family?

B.

1. Give a definition of Domestic Economy.
2. What is the best flesh for roasting?
3. What is best suited for salting?
4. What are the fattest kinds of food?

STAGE II.

A.

1. Name furniture and utensils for a bedroom, and give the prices if you can.
2. Tell how to scrub a kitchen floor.
3. What would you purchase if you were asked to furnish a kitchen?

B.

1. What is a dust-bin? How could you get rid of it in the household?
2. How would you proceed to light a parlour fire?
3. What would you use to take ink out of a table-napkin?

STAGE III.

1. How would you warm and ventilate a sick-room?
2. What is a sprain? How would you dress it?
3. How would you keep the sick-room quiet?

—o—

Monthly Notes.

THE SCHOOL BOARD FOR LONDON is the most important educational body in London, we may say in the world, if its importance be measured by the scale of its operations. The estimate of its probable expenditure during the year from the 25th of March 1880 to the 25th of March 1881 has just been put into the hands of the members. This estimate gives a total for the year of £724,870, being an increase on that estimated last year of £71,507. The sum of £48,291 will remain as a surplus at the close of this year; this being deducted from the sum required for the ensuing year, will leave the sum of £676,579 to be levied by precept. For the current year the average attendance of pupils is estimated at 196,704, the cost per pupil being 34s. 3d. For the ensuing

year it is calculated that the average of pupils will be 224,014. The Board has resolved to employ an additional inspector, which will bring its inspectorial staff up to seven, each having the inspection of schools containing about 30,000 children. Like the House of Commons, the Board has also deemed it necessary to effect considerable modification of its rules of procedure in order to prevent the obstruction of its operations.

THE TEACHERS' REGISTRATION BILL.—This bill, which 'purports to have been prepared and brought in' by Sir John Lubbock, and which has also on the back of it the names of Mr. Playfair and Mr. Balfour, is at the present time one of the subjects in which educationalists are chiefly interested. The bill waits the second reading; meanwhile it is being earnestly studied and discussed by the various educational bodies. It was the chief subject of discussion at the Annual Conference of the Teachers' Association, which was held in the Theatre of the Society of Arts, on Friday, January the 7th. A resolution was passed approving of the principle of the bill. But in its present form elementary teachers are excluded from the proposed registration, and this part of the bill was hotly opposed by Mr. Heller and Mr. Grove, on the part of the National Union of Elementary Teachers; ultimately a resolution was carried, with but few dissentients, 'That elementary teachers be admitted to the register.' The bill was also discussed at the January meeting of the Convocation of the University of London. The number present, however, was unusually small, in consequence of the inclemency of the weather. It was therefore agreed that the discussion should be adjourned. In the present state of business in Parliament there is no chance of an opportunity for a second reading being obtained for some time.

THE ANNUAL MEETING OF THE ASSOCIATION OF PRINCIPALS OF PRIVATE SCHOOLS was held at Anderton's Hotel on the 11th of January. The principal business was the discussion of a paper by Mr. J. Stewart on 'Examination for Secondary Schools.' There was a general agreement of opinion that the bill about to be brought in by Sir John Lubbock should make some arrangement for such examinations.

THE annual meetings of two important London educational institutions were held during the first month of the year—the City of London College, and the Birkbeck Institution. The former is doing a great work among young men occupying situations in the City especially; the other is no less useful to a certain extent among the same class, but especially among the higher class of artisans. Both institutions stand much in need of more commodious premises and larger resources. The City of London College has secured a site and a portion of the money required for this purpose.

THE EDUCATION CODE for the current year was laid on the table of the House of Commons on Thursday the 3d February. No changes have been made on that of the past year, except in the article of half-timers, which has been modified to meet the requirements of the Act of last year. The Department hope, however, later in the season, to lay on the table a minute embodying changes, which will be well considered, with a view to simplifying the Code and securing the best results, and which they hope to introduce into the next year's Code.

THE COLLEGE OF PRECEPTORS held the public distribution of prizes and certificates awarded to candidates at the Christmas examination, at the Memorial Hall, Farringdon Street, on Wednesday, February the 16th. The Right Hon. Lord Norton occupied the chair. The monthly meeting of the members was held at the College rooms on the evening of the same day, when a paper was read by David Nasmith, Esq., LL.B., on 'Economic Methods of Teaching.' An interesting discussion took place after the lecture.

TEACHERS' ASSOCIATIONS.—The quarterly meeting of the West Lambeth Association was held in Gideon Road Board School, on the 5th of February. There was a very large attendance. Thirty new members were elected, making the total 230. Business connected with the ensuing Conference of the Union was transacted, and a resolution was passed affirming that 'Training colleges should be open to all Queen's scholars fulfilling the Government requirement.' —The quarterly meeting of the Southwark Teachers' Association was held in Webb Street Board School, on Saturday the 12th February. Business connected with the ensuing Conference was transacted. A paper was read on 'Thrift' by the Rev. John Sinclair, formerly member of the School Board; and Mr. T. Heller delivered a short address, pointing out desirable amendments on the Teachers' Registration Bill. There was a very fair attendance.

Engagements for March.

Mar. 1.	Gresham Lecture, Rhetoric,	6 p.m.
2.	Society of Arts, 'Flashing of Signals for Light-houses.' Sir William Thomson,	8 p.m.
	Gresham Lecture, Rhetoric,	6 p.m.
3.	London Institution, 'The Production of Electricity.' Professor W. E. Ayrton,	7 p.m.
	Gresham Lecture, Rhetoric,	6 p.m.
4.	Society of Arts, Indian section, 'The Results of British Rule in India.' J. M. Maclean,	8 p.m.
	Gresham Lecture, Rhetoric,	6 p.m.
	London Institution, 'Electricity viewed as possibly a Mode of Motion.' Sir William Thomson,	7 p.m.
5.	Working Men's College, 'Dr. Johnson.' Leslie Stephens, M.A.,	8 p.m.
7.	London Institution, 'Vulgarisms.' Mr. E. B. Nicholson,	5 p.m.
	Victoria Institute, 'Language, and Theories of its Origin.' R. Brown, F.S.A.,	8 p.m.
	First Grade Drawing Examination (about).	
8.	Anthropological Institute,	8 p.m.
	Society of Arts Examination, Arithmetic.	
9.	Society of Arts, 'Improvements in the Treatment of Esparto in the Manufacture of Paper.' W. Arnot, F.C.S.,	8 p.m.
	Society of Arts Examination, History and Geography.	
	The Geological Society of London.	

(*For continuation, see page 44.*)

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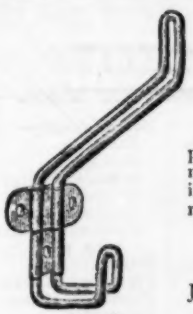

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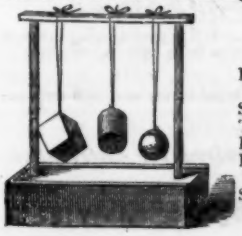

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